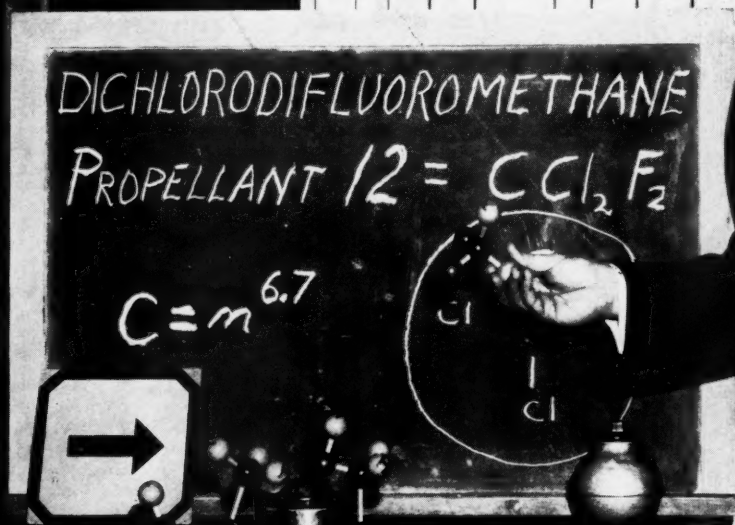


FARM CHEMICALS

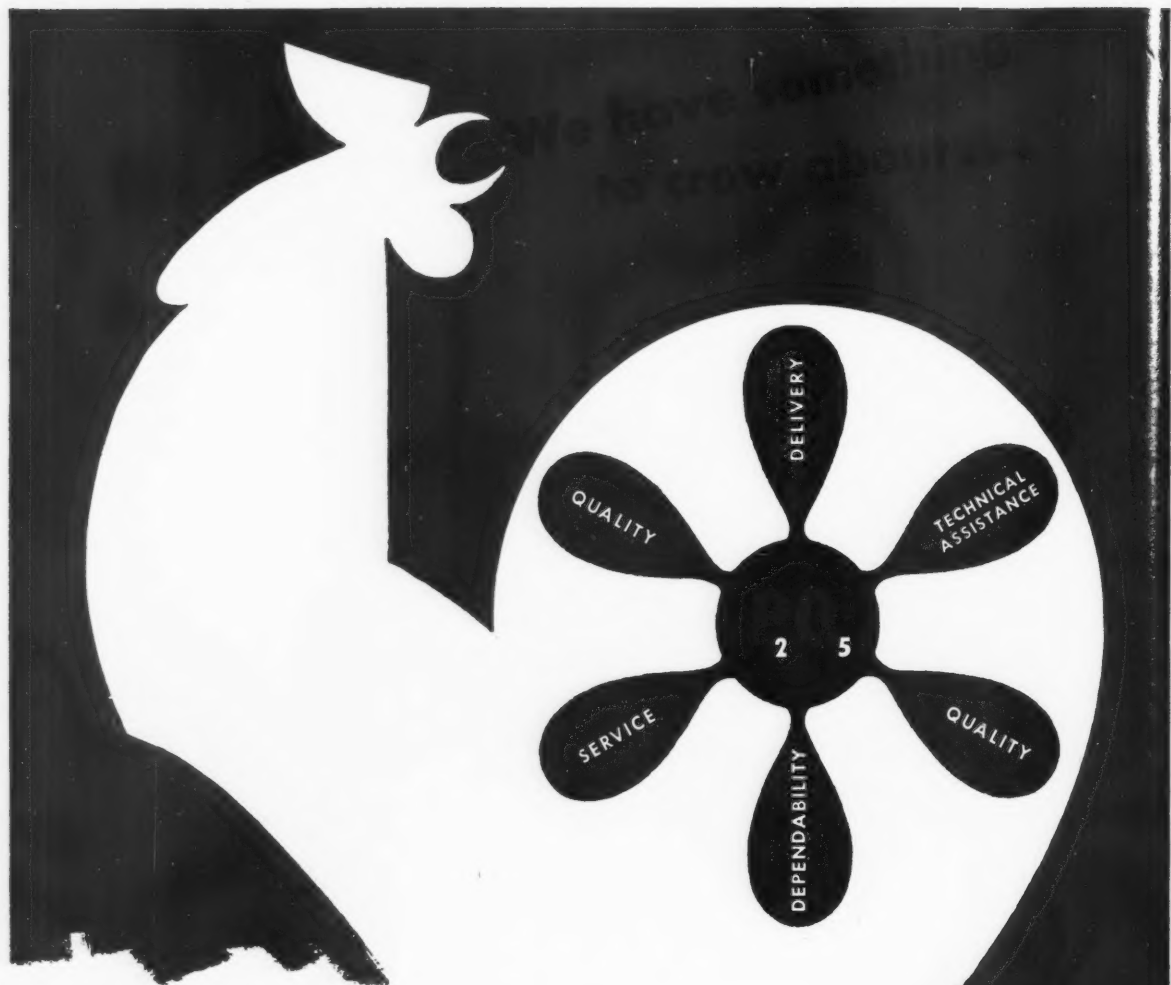
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Pioneer Journal of the Industry



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**Special this month:
first annual listing
of merchandising aids**

Here's How We Can
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DAVISON Hi-Flo Gran-U-Lated Triple Superphosphate is unexcelled by any other



(S₁Q₂D₂TA₁) The Davison formula of properly proportioned parts of Service, Quality, Dependability, Delivery and Technical Assistance (S₁Q₂D₂TA₁) is as important to you in your choice of source as anything else we could name.

In every field, there is always one particular brand that is so outstanding that it is head and shoulders above the competition. That is true of Davison Hi-Flo Gran-U-Lated Triple Superphosphate. Here is the product that *is* the standard of comparison for all other granulated triples. Davison Gran-U-Lated Triple Superphosphate is uniform in particle size . . . dust free and will not break down or crumble in the bag. It is ideal for direct application or for formulation of dry materials. Most of all, with Davison Gran-U-Lated you are certain of constant uniformity . . . it is GUARANTEED 46% available P₂O₅ . . . every time.

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**NOW you can formulate
high concentrate wettable powders
at low cost with
MICRO-CEL**

SUBSTANTIAL FORMULATION SAVINGS

Micro-Cel®, a new line of synthetic calcium silicates, has extremely high absorptive properties. It is this remarkable capacity for absorption that makes it possible to prepare wettable powders with higher concentrations of dry, viscous or liquid poisons. Micro-Cel's absorption also means that more lower cost diluents can be used. Thus high strength formulation costs are now cut to a new low.

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In addition, suspension values after storage of 1.5

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DEVELOPED BY JOHNS-MANVILLE RESEARCH

Micro-Cel is another development of Johns-Manville Research. Combining high absorption, large surface area, small particle size and excellent dry flowability, it offers a unique combination of properties for insecticide formulation and other process needs.

Sample quantities and carload shipments are now available. Write for further data and sample formulations for poisons of interest to you. Or ask a Celite engineer to help you adapt Micro-Cel to your particular requirements and specifications.



*Micro-Cel® is Johns-Manville's new absorbent-grinding aid designed specifically for the insecticide formulator.

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SYNTHETIC CALCIUM SILICATES
A PRODUCT OF THE CELITE DIVISION

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Please send ☐ further information; ☐ samples of Micro-Cel. I am interested in using Micro-Cel with the following poisons:

☐ Please have your local representative contact me.

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Company _____

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City _____ Zone _____ State _____

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MEMBER BUSINESS PUBLICATIONS AUDIT

The national business magazine for the fertilizer and pesticide industries, FARM CHEMICALS, serves primarily those persons responsible for management, marketing and production. It has a qualified circulation for selected executive and supervisory persons within specified segments of these industries, as well as in certain closely allied fields. Subscription rates to all others are: in the U.S., its possessions, Canada, Cuba and Panama: \$6.00; in other countries: \$7.50. Single copy 50 cents. Established in 1894 as *The American Fertilizer*.

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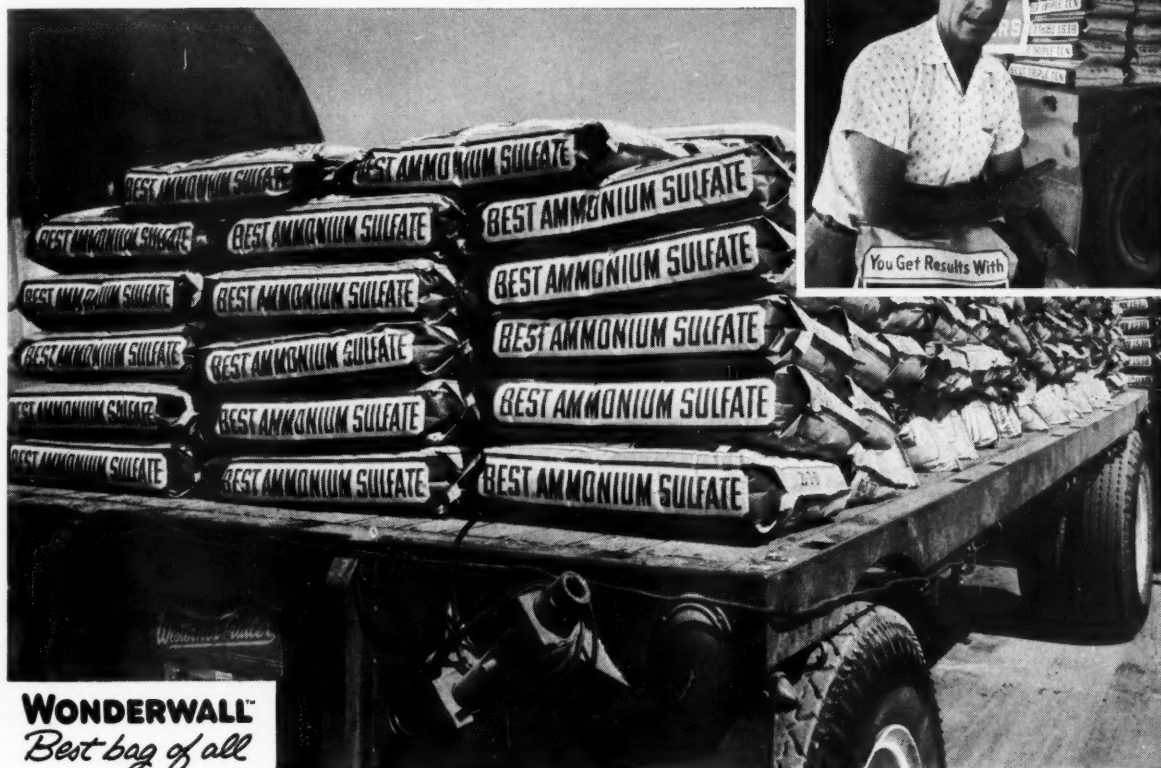
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THE COVER PICTURE

Farm Chemicals selling could use some of the "blazing" tactics displayed by Dan Anderson, chemical salesman for Allied Chemical Corporation and this month's cover subject. Dan is on the NAC convention program where he will display a little selling magic. He bills himself as the "World's Greatest Magician (by that name)." We expect to see farm chemicals sales people watching him with keen interest! *FARM CHEMICALS* photo, courtesy *Allied Chemical Corporation*.

"WONDERWALL™ reduced our losses from damaged bags by 75%"



WONDERWALL™
Best bag of all

"Losses caused by damaged bags have been reduced by at least 75% since we started shipping our twelve different formulas of ammonia phosphate and sulfate fertilizers in WONDERWALL bags," says Mr. Alfred G. Roecks, assistant plant manager at the Best Fertilizers Company, Lathrop, California.

The Best Company packs 80# of fertilizer in a sewn valve bag, 15" x 4½" x 32½". The old 4-ply natural kraft bag they used was 1/40, 2/50, 1/60, totaling 200# basis weight. The 3-ply WONDERWALL bag they are now using is 2/50, 1/70, totaling 170#. These bags—15% lighter—have proved to be *stronger* than their previous 4-ply bags!

WONDERWALL is West Virginia's new, tougher multi-wall that outperforms ordinary bags because it's made of Kraftman Clupak* paper. This extraordinary paper stretches and withstands punishment that breaks ordinary kraft. Best now plans to use bags made from Clupak extensible paper exclusively.

Besides obtaining reduced breakage, many companies packing fertilizers, feed, cement, chemicals and similar products are also achieving substantial *bag cost savings* through use of the lighter, tougher WONDERWALL bags.

Let a West Virginia representative show you how you can cut bag costs and reduce breakage. Write or call Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Avenue, New York 17, New York.

*Clupak, Inc.'s trademark for extensible paper, manufactured under its authority.



**West Virginia
Pulp and Paper**



PRODUCTS AND SERVICES FROM IMC

- Phosphate Rock
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- Muriate of Potash (Coarse, Standard, Granular)
- Sulphate of Potash
- Sul-Po-Mag

Manufacturing and Technical Service
Transportation Service
Customer Service
Management Services
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On-site advice for new plant construction helped customer in design and efficiency of equipment.



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Modern fertilizer manufacturing ranges from relatively simple to vastly complicated manufacturing problems. Both problems require integrated service from basic suppliers. That's why your IMC

TECHNICAL SERVICE MAN WITH A^V MISSION

Rolls up his sleeves to give you on-the-spot help. He is trained, equipped . . . dedicated to solving your full range of manufacturing problems.

Your IMC technical service man knows what an inaccurate calibration of a flow meter can cost you . . . he knows and understands the importance of peak production through the rush season — and that a plant shutdown of only a few hours can cut heavily into your year's profit. He is a fertilizer man by experience and training. He has the know-how to pitch in and help — not only when problems occur but also in seeking out and preventing trouble before it happens.

Only IMC as a basic supplier of a full line of products and services can give you unbiased service of this scope. Your IMC technical service man can correct and evaluate your formulas for cost, quality and analysis of finished product.

Equipment specification, buying and usage are other areas where IMC technical advice can save you time and keep you up-to-date on recent advances in the field. Safety programs, technical training, plant layout and materials handling are among many other phases in which IMC can give you in-plant help. Five regional offices enable your IMC technical service man to serve you quickly and efficiently.

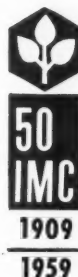
Use the extra knowledge, the new ideas, the cost-cutting techniques which IMC can bring to bear. Your IMC technical service man concentrates on your whole manufacturing problem. He has a mission of total service. He awaits your call.

Products for Growth*

AGRICULTURAL CHEMICALS DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

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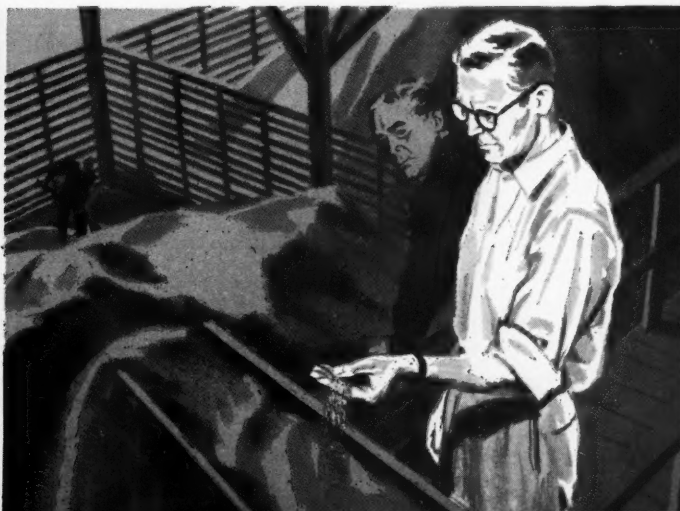
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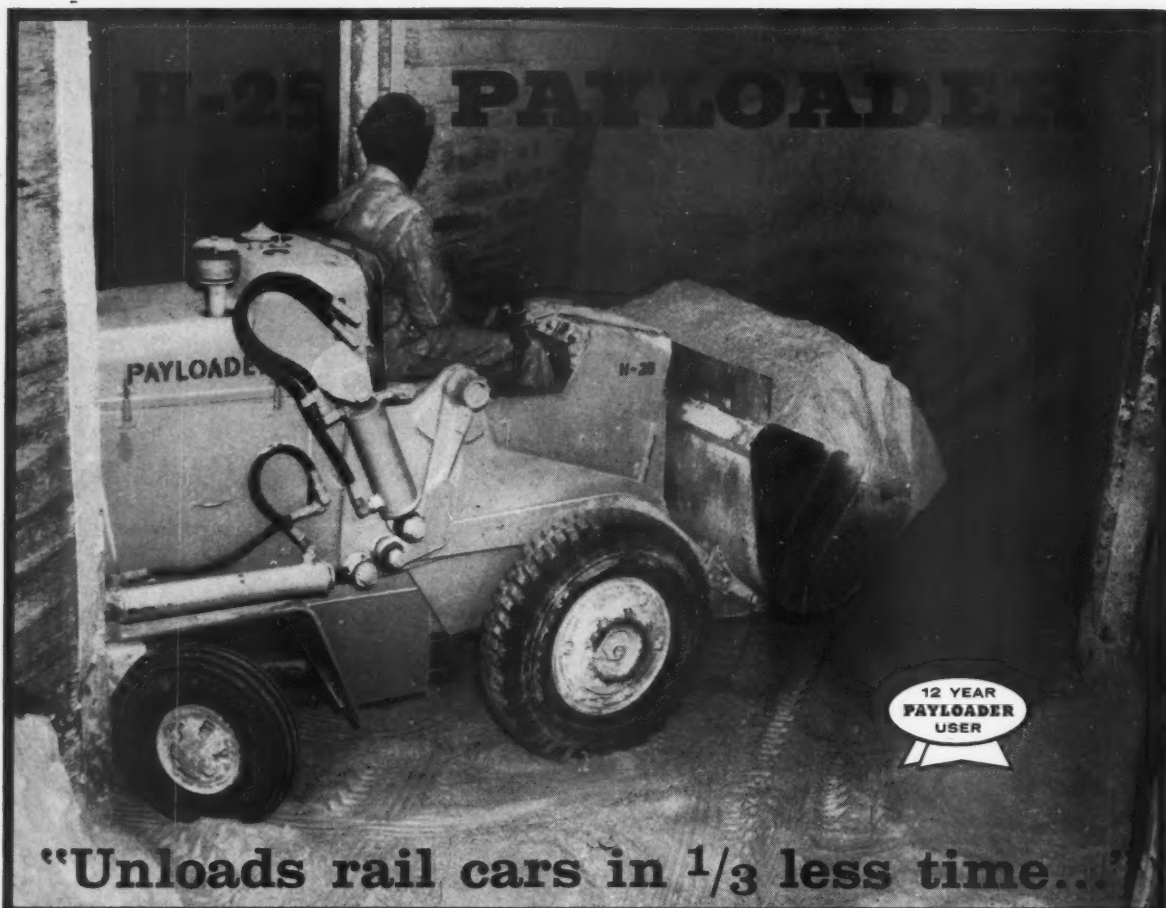
*Trademark

Training of personnel in new processes helped speed startup, produce high quality quickly.

Advice on formulation problems helped raise quality of customer's finished product.

customer





"Unloads rail cars in 1/3 less time..."

"... It's fast and has adequate power to get full bucket loads under any conditions existing in our plant", continues D. W. Brant, Plant Supt. of Screven Oil Mill, Sylvania, Ga. "The H-25 is daily proving it's the ideal size machine for all phases of our fertilizer and limestone handling work. We have been using "PAYLOADER" units for 12 years with outstanding, continuous service and low repairs."

If you want top production from a six-foot-turning-radius machine, you should try a Model H-25. In carry capacity, in output, and in proven dependability it has no equal.

Other proven "PAYLOADER" models are also available, from 2,000 to 12,000 lbs. carry capacities, to meet your every material handling need. Your Hough Distributor is ready to serve you. See him today.

Maneuverability and Speed . . .

The H-25 with 2,500 lb. carry capacity, only 6 ft. turning radius and easy power steering, is the most concentrated package of tractor-shovel productivity ever designed. Power-shift transmission with two speeds forward and reverse, power-transfer "no-spin" differential, and 4,500 lbs. of bucket break-out force are other outstanding features that speed production and reduce operator effort.

THE FRANK G. HOUGH CO.

704 Sunnyside Ave., Libertyville, Ill.

☐ Send full facts about the H-25 PAYLOADER ☐ Other PAYLOADER Models

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SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY



LETTERS

**F
C**

INTEREST IN "FCMS"

Birmingham, Ala.
We would like to receive detailed information on the Farm Chemicals Marketing Seminar to be held in New York on November 16th and 17th.

Yours very truly,
R. H. NORRIS, JR.
Vice President—Sales
ALABAMA BY-PRODUCTS CORP.

Baltimore, Md.
We are interested in your FCMS (Farm Chemicals Marketing Seminar) program in November. Please send details.

DR. EUGENE J. GERBERG
President
CORNELL CHEMICAL &
EQUIPT. CO., INC.

New York, N. Y.
I just completed reading with great interest about your forthcoming seminar for the farm chemical industry in the September 1959 issue of FARM CHEMICALS.

Let me say that such a seminar, I believe, will be of great value to this ever growing industry. I for one, as product manager for not only a new product but a new concept in farming, i.e., Moly-Gro, am certainly looking forward to benefiting greatly from this seminar.

So that I can be sure not to miss any of the details as to times, agenda, etc., I would certainly appreciate your keeping me informed regarding these details. I would also like to know if I could arrange to have a representative from our advertising agency and our national sales agent attend these meetings.

Very truly yours,
W. M. STILWELL, Manager
Agricultural Sales & Development
CLIMAX MOLYBDENUM CO.

Menlo Park, N.J.
Please give me further details concerning the Farm Chemicals Marketing Seminar to be held in New York in November 16 and 17.

A preview of the seminar was featured on page 30 of the current September issue.
Very truly yours,
J. R. MEEHAN
MINERALS & CHEMICALS CORP.
OF AMERICA

CHELATES IN FLORIDA

Chicago, Ill.
If available, please send reprint of article, "Chelates in Florida Citrus Production"—August '59 issue. Thanks.
R. E. GRAVROK
Technologist
TEXACO INC.

Macon, Ga.
I would like to send to some friends in Latin America C. D. Leonard's article, "Chelates in Florida Citrus Production" published in the August issue of your publication.

If reprints of the article are available,

please send me five copies. If not, please send me five copies of the magazine and bill the same to me.

Thanking you, I am
Yours truly
DR. THEO SCHWARZ
% TRIANGLE CHEMICAL CO.

South Gate, Calif.
The writer would like tear sheets of the following article if possible:

C. D. Leonard, "Chelates in Florida Citrus Production," FARM CHEMICALS 122, No. 8, 48-51 (August, 1959).

Very truly yours,
W. M. Ramsey, Chief Chemist
A. R. MAAS CHEMICAL CO.

ON FC POLICY

Rocky Mount, N. C.
I just want to say "thank you" for your editorial in the September issue of FARM CHEMICALS. Thank God there are people in the publishing business that are, to quote you, "for good orderly marketing that assures a profit for the organization." My personal feelings are that Mr. Wyckoff has no reason to ask for a rebuttal. There has never been any indication, to me, that your publication has ever taken sides on any question. It appears that, rather, you tend to present both sides of a problem and leave the conclusion up to your readers; and you present both sides very creditably, too. Please don't change your policy!!

Mr. Berg, I am very much interested in the coming F.C.M.S. scheduled for November 16-17 in New York. From the brief resume in the September issue, it appears that much can be learned from being present at this Seminar. Would you be so kind as to let me have more complete details so that I might present them to our management with the idea of selling them on the benefits that could be derived, to our company, by my presence at this Seminar. Thank you.

With all good wishes for your continued success, I am

Sincerely yours,
H. S. SURLS, JR.
PLANTERS COTTON OIL &
FERTILIZER CO.

MERCHANDISING PRINCIPLES

Streator, Ill.
We would like you to include C. E. Austin, Box 83, Gibson City, Ill., who is in charge of education and sales promotion for this division on your mailing list so that he will receive your publications.

If it would be possible, I would like for you to send him the last several issues of your publication to include the series on "Merchandising Aids and Promotion" and "The Basic Principles in Merchandising Fertilizer." You have had some very excellent articles in your last several copies.

Very truly yours,
R. W. BRUN
Sales Manager
SMITH-DOUGLASS
COMPANY, INC.

A "UNIVERSAL PROBLEM"

Minneapolis 13, Minn.
Seldom do I take the time to write and comment on specific articles appearing in publications. However, I was so impressed with the article by F. E. Hartzler entitled "Clean Up Your Communications" from your August 1959 issue (page 25), that I wanted to compliment you on this article.

There is no more universal problem than communications. Each of us is challenged by it daily. It is essential to the future of every business, and every individual in that business. So when an article as well prepared and as thought provoking as the one by Mr. Hartzler appears, it deserves recognition.

In my opinion, this article bears repetition, or at least capsuling and reviewing in future issues of your publication.

It has been my privilege to know Erwin Klaus and I have enjoyed his writings in several publications. He is a very aggressive marketer who practices the principle of hard work, creative thinking and applied communication.

Sincerely,
K. H. ERICKSON
Director
Marketing-Advertising
NORTHRUP, KING & CO.

SUCCESSFUL SELLING SERIES

Dallas, Texas
We have admired very much the article "What's In It for Me" appearing in your September issue of FARM CHEMICALS.

Will you kindly let us know if it will be possible and the cost to obtain 200 reprints of this article?

Sincerely,
ROBERT V. PARR
NATIONAL DISINFECTANT CO.

New York, N. Y.
We like the article "14 Ways to Win Definite Decisions" a great deal. It appeared in your June, 1959 issue.

May we have your permission to reproduce it, with a credit line for FARM CHEMICALS? . . .

Sincerely,
GORDON D. RAPP
WILDRICK & MILLER, INC.

HERBICIDE MARKET REPORT

Newark, N. J.
I would appreciate some information on how to contact Doane Agricultural Service in order to obtain the herbicide market report you have written up on page 50 of the July 1959 issue . . .

Very truly yours,
C. FEINBERG
Ag Chemicals, Tech. Service
DIAMOND ALKALI CO.

For the benefit of Mr. Feinberg and any other FARM CHEMICALS reader wishing a copy of this fine report, please write to Mr. Elmer C. Denis, manager of research division, Doane Agricultural Service, 5144 Delmar Blvd., St. Louis, Missouri.

WHAT'S DOING IN THE INDUSTRY

**F
C**

E. W. CANNON JOINS MOYER

Moyer Chemical Co. has announced appointment of Earl W. Cannon as a vice president. For the past ten years, he has served as director, vice president and manager of marketing for California Spray-Chemical Corp. He had been with Calspray for 30 years.

Moyer president, George Pierce, said that Cannon will serve as manager of field marketing.

USDA'S K. D. JACOB, W. L. HILL REASSIGNED

Kenneth D. Jacob has been reassigned from his position as chief, Fertilizer Investigations Research Branch, to serve as special assistant to the director of the Soil and Water Conservation Research Div.

William L. Hill, who has been serving as head, Fertilizer Materials Section, succeeds Jacob as chief of the branch.

SMITH-DOUGLASS, SMITH AG CHEM. MERGER COMPLETED

Merger of Smith-Douglass Co. with Smith Agricultural Chemical Co. was consummated and became effective Sept. 15. As the surviving corporation, Smith-Douglass acquires additional operating plants at Columbus and Carey, Ohio; Saginaw and Holland, Mich.; and Indianapolis, Ind.

W. F. Farley, former president of Smith Agricultural Chemical, has been named assistant to J. H. Culpepper, vice president of the Smith-Douglass fertilizer division.

NEW ANTIBIOTIC, TYLOSIN, DISCOVERED

A new antibiotic, said to have wide potential applications, particularly in agriculture, has been discovered by Eli Lilly and Co. scientists. Called tylosin, the antibiotic is effective against a number of gram-positive bacteria and is relatively nontoxic, readily soluble and relatively stable in solution.

According to J. F. Downing, Ph.D., director of Lilly agricultural research, experiments indicate that tylosin is highly effective in inhibiting pleuropneumonia-like organisms (PPLO) involved in chronic respiratory disease of chickens and infectious sinusitis of turkeys.

Research is being continued to determine effectiveness of the antibiotic in controlling both animal and plant diseases.

Meeting Highlights

THIS MONTH:

Symposium—"Research Progress on Insect Resistance"

Mayflower Hotel, Washington, D. C.

October 7, morning session: Presidents of the sponsoring organizations, Dr. Paul W. Oman, Entomological Society of America, and J. V. Vernon, National Agricultural Chemicals Association, will be introduced, followed by a statement of symposium objectives by Robert L. Metcalf, University of California, the symposium chairman. *Definition of the Resistance Problem as Affecting Agricultural Pests—Current Status* includes discussion of red spider mites, orchard pests, vegetable pests, cotton insects and mites and livestock pests.

Luncheon. Speaker is Dr. A. W. A. Brown, University of Western Ontario, on "The Insecticide Resistance Problem in the W.H.O. Programs for Vector Control."

Afternoon session: *Fundamental Knowledge Now Available About Insect Resistance to Insecticides.* There will be discussion of genetics of insect and mite resistance and the need for quantitative measurement of level and extent of insecticide resistance in field populations.

October 8, morning session: Biochemical studies on insecticide resistant insects will be covered.

Luncheon: Speaker is Dr. William P. Boger, director of research, Norristown State Hospital, on "Antibiotic Resistance Problems in Man."

Afternoon session: *Views on Future Research* and a summary and recommendations by the symposium chairman.

NEXT MONTH:

Fertilizer Industry Round Table

Mayflower Hotel, Washington, D. C.

Theme: Practical Problems of Processing Fertilizers

November 4. Following introductory remarks by V. Sauchelli, chairman, the topics are "Plant Processes from Raw Materials to Bagging," "Mechanics of Calculating Formulations," and "Models Replace Blueprints."

November 5. "Problems of Conventional Fertilizer Manufacture," including mechanical condition and segregation, will be discussed during the morning session, with semi-granular mixtures and statistical quality control on the agenda for the afternoon session.

November 6. Panel Discussion—"Pre-Neutralization"

DATES FOR MIDWEST MEETING

The Midwest Agronomists-Industry meeting will be held February 11 and 12, 1960 at the Edgewater Beach Hotel, Chicago, Ill., according to the National Plant Food Institute.

CHASE APPOINTS HAZARD

Chase Bag Co. has appointed Hazard Advertising Co. as its advertising agency, effective Nov. 1, according to an announcement by Alden W. Clark, advertising manager. Richard LaBarre will function as advertising account executive, James R. Thompson as public relations account executive.

HOOKE STOCKHOLDERS VOTE ISSUANCE OF DEBENTURES

At a special meeting Sept. 10 at company headquarters, Niagara Falls, N. Y., holders of Hooker Chemical Corp. common stock authorized the board of directors to issue up to \$25,000,000 of Convertible Subordinated Debentures.

NEW NIAGARA AGENCY

Niagara Chemical Div., Food Machinery and Chemical Corp., has appointed G. M. Basford Co. to develop an integrated program of advertising, publicity and sales promotion.

IT ALL COMES DOWN TO THIS CRITICAL POINT



... the core where ground phosphate rock and phosphoric acid meet to make Trebo-Phos*, the triple superphosphate with controlled porosity for proper ammoniation. American Cyanamid Company, Agricultural Division, New York 20, New York. *Trebo-Phos is American Cyanamid Company's trademark for its triple superphosphate.

CYANAMID SERVES THE MAN WHO MAKES A BUSINESS OF AGRICULTURE

OCTOBER, 1959



WASHINGTON VIEWPOINT

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▶ *Although overall farm income this year will be down, farmers will have more money to spend for farm chemicals in 1960 than they had in the past year.*

▶ *Senator Carlson outlines three major "misconceptions" about farm programs.*

▶ *If any farm legislation is enacted next year, it will aim at increasing spendable farm income . . . offering the farmer income incentives to hold down production.*

Farmers will have more money to spend for farm chemicals and fertilizer in 1960 than they had in the past year. This may come as somewhat of a surprise, in view of recent press headlines indicating that farm income this year will be down by as much as \$1½ billion from 1958's high level.

The headlines may have been misleading for this reason: They were based on stories which stressed the over-all level of farm income prospects. That is, they included the income outlook for livestock and livestock products and government payments, as well as income from field crops. The fact is, however, that income from livestock and government payments *will* be down, but income from field crops will be *up*. The lower income from the former more than offset the increased income from the latter in the overall situation.

The total picture is this: Gross farm income from sales of all commodities this year may be about \$800 million off the 1958 level of \$38.3 billion. Costs of production this year are estimated at just under \$26 billion, up a half-billion from 1958. The result is likely to be a realized 1959 net farm income of about \$11.5 billion, compared with \$13 billion in 1958. Income from livestock and poultry will be down considerably because of low hog prices and last spring's egg market collapse. Government payments will be down this year because the money pumped into the economy by the Soil Bank's Acreage Reserve last year isn't available this year because the program died last December.

The specific crop picture is this: Farm cash receipts for all field crops (excluding livestock) were running more than \$150 million ahead of a year earlier at mid-year. This was possible because of the marketing of a larger crop volume following last year's record total production. It came despite a somewhat lower price level. Agriculture Department economists are predicting that income from field crops in the closing months of this year will move strongly above that of last year. The reasons for this prediction are obvious when you study the USDA crop forecasts for corn and cotton.

The 1959 cotton crop now is estimated at 14.7 million bales—a whopping 3 million more than was produced last year. While market prices may be down slightly, most of the crop will be covered by government support money, and it means a sizeable increase in farm cash receipts because of bigger volume sales. As for corn, the crop is now estimated at 4.4 billion bushels, an imagination-shattering new record. It will be a big 600 million bushels greater than the previous record of 3.8 billion bushels harvested and sold from last year's crop. In addition to the much bigger sales volume of corn due in the closing months of 1959 and the first half of 1960—the price support for the majority of farmers on this crop is 6 cents a bushel *higher* than the support available for last year's crop. The higher support, plus the bigger volume of sales means a solid increase in farm cash receipts in corn areas.

The price support programs for this year's crops are turning out to be good business as far as the chemical-fertilizer industry is concerned. Without the supports, or with lower support levels, the farmers' income position very likely would not be as rosy in these two crops as it now is. With the harvest, farmers will have fresh cash in their pockets—since most can put corn and cotton immediately under support loan and receive cash on the spot. The 1959 corn and cotton crops will bring returns to farmers which may turn out to be the best in many years. Add that to the growing awareness of farmers as to the income potential of pesticides and fertilizers, and you can come up with some pretty good indications of what the farm market will be like in the year ahead. It all means that the income of farmers who use the fertilizer and much of the other farm chemicals are making the money this year. This is money that they plan to churn back into bigger production in 1960.

An insight into federal farm programs now comes from a "moderate" among congressional farm leaders, a man not known for ill-considered statements, and a respected Republican. He is Sen. Frank Carlson of



38 plants...for prompt delivery of AA quality products

38 plants of the A.A.C. Co., located in the United States, Cuba and Canada, with main office in New York, assure you dependable, fast deliveries of AA quality products for farm and industry. You can schedule your production with confidence... the right quantity and grade will be at your plant when you need it.

*for uniform quality, prompt delivery
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Company

GENERAL OFFICE: 100 Church Street, New York 7, N.Y.

producers of:

Florida Pebble Phosphate Rock • Superphosphate
AA® QUALITY Ground Phosphate Rock
All grades of Complete Fertilizers • Keystone® Gelatin
Bone Products • Fluosilicates • Ammonium Carbonate
Sulphuric Acid • Phosphoric Acid and Phosphates
Phosphorus and Compounds of Phosphorus



What's Coming Next Month



What's coming next month? **FCMS!**

This column is generally reserved for articles which will appear in the next issue. But it isn't every month that the industry is treated to anything like a marketing seminar. In fact, to our knowledge, nothing like this has ever been done. So we've steered off the main course for a minute to get another plug in for **FCMS!**

For full details, read the article on page 28 and the editorial on page 76 of this issue. Then make up your mind that you want to learn some lessons from real marketing pros. Believe us, they'll be there at **FCMS!**

Now for next month's main features...

■ HOW TO FIGURE SALES POTENTIAL

The author is once again the popular F. E. Hartzler. (Why change when we're winning?) He will bring you various methods of deriving sales potential, and of course, it will be up to you to determine which is most adaptable to your own situation. Hartzler's style of "jiggle and poke" has brought us nothing but the finest response. You'll profit from his ideas again next month.

■ SUPERPHOSPHATE PRODUCTION

Heading up our regular Production Methods section will be a discussion on a procedure for calculating the reagent acid requirements for superphosphate production. This method is based on the lime-phosphate ratio of phosphate rock, after correcting for fluorine combined as calcium fluosilicate.

■ NAC CONVENTION REPORT

The doings at French Lick this month will be brought to you in words and pictures. We can't guarantee individual golf scores, of course. No cooperation.

... in the new

FARM
CHEMICALS

BPA

WASHINGTON VIEWPOINT

Kansas. In a recent speech, he outlined three major "misconceptions" about farm programs.

No. 1 misconception: Control programs have been ineffective and that high price supports have stimulated production. Citing USDA figures, Carlson says that production of "basic" crops—corn, wheat, cotton, rice, and tobacco—was 21% lower the last 5 years than for all other crops. Using the two years before acreage controls were invoked, 1952–53, he says that when feed grains other than corn and soybeans were added to the list—the combined production still was 2% lower in relation to 1952–53 than non-price supported crops.

No. 2 misconception: Producers of non-supported products, particularly livestock, have demonstrated the superiority of free market policies in recent years. In the last 6 years, Carlson says, on a net basis, 94.5 million tons of feed grains and wheat were removed from commercial market channels by surplus disposal and government storage programs. If this added feed had remained in commercial markets, feed supplies would have been 14% greater—thus increasing livestock production and lowering livestock prices. Carlson says a price umbrella has been held over livestock producers in recent years by corn and wheat controls, and surplus disposal programs.

No. 3 misconception: Market expansion through lower prices will absorb increasing farm production.

Despite greatly increased promotional efforts, he says, the larger population of 1957—with 10% higher real income than in 1952—bought only 11% more food than 5 years earlier. Still, farmers received a half billion dollars less for this food than for the smaller quantity in 1952.

Carlson points out that in 4½ years of surplus disposal, a total of \$10½ billion of farm products were removed from commercial channels. This was at a rate of \$2.4 billion yearly. If these products had moved into commercial channels, they would have caused a sharp decline in prices. The most recent studies show that annual farm income would have dropped by at least twice this amount.

Farm legislation next year—if any is enacted—will aim at increasing spendable farm income. Main tip-off comes from the type of man who is running for the presidential nomination, in both parties. Not one, in either party, follows the farm line set down by the current Administration. It indicates the trend of leadership—no matter who the president eventually will be—is decidedly liberal as far as federal farm policy is concerned.

This means: Whatever farm legislation is enacted, be it in 1960 or later, it will be based on "solving the farm problem" the easy way. That is, offering the farmer income incentives to hold down production. The approach during the past 7 years has been an attempt to force cropping adjustments through a withdrawal of government benefits. For all intents and purposes, this approach seems to have failed—for whatever reason.



Only BAGPAKS® have a built-in insurance policy backed by International Paper

ACCIDENTS like this *will* happen. That's why International Paper plans for extraordinary stresses and strains when designing its Bagpak multiwall bags.

Only genuine *Gator Hide*® kraft, famous for toughness, is ever used in making Bagpak multiwalls. Quality is controlled every step of the way. International Paper can do this because it grows its own trees, makes its own paper, converts it into printed multiwall bags to your order. It also designs and builds *Bagpaker*® machines that

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When you buy Bagpak multiwall bags you get speedy shipments geared to your production schedules. *Twenty-one* sales offices and four strategically-located plants save you money by keeping your inventory at a minimum.

Only Bagpak multiwalls are backed by the full resources of International Paper—world's foremost pulp, paper and paperboard producer.

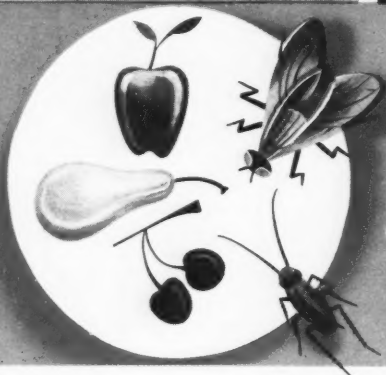
Next time your Bagpak field service engineer drops by, ask him what's new. He knows.



Bagpak Division **INTERNATIONAL PAPER** New York 17, N.Y.

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INSECTICIDES



DIAZINON INSECTICIDE

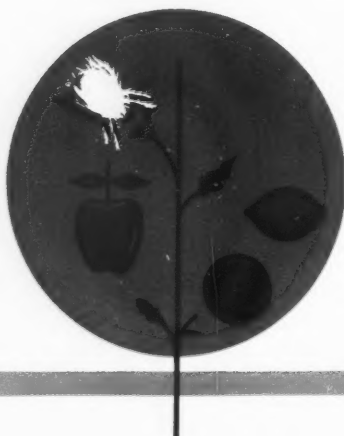
Effective, relatively safe, long residual phosphate insecticide. Controls a wide variety of insects, including "hard-to-control" varieties, on many fruit and vegetable crops. May be applied relatively close to harvest. Used for residual fly control in food processing plants and in dairy barns. Preferred by PCO's for control of roaches and household insects. May be formulated in over-the-counter household insecticides.



GEIGY METHOXYCHLOR INSECTICIDE

Multi-purpose insecticide. Low toxicity to humans and animals. Long residual action against many species of insects attacking fruits, vegetables and forage crops. May be applied to many crops up to 7 days before harvest period. Residual sprays applied to empty grain bins are effective in controlling many insects of stored grain. Direct application as a spray may be used on livestock other than dairy cattle for effective control of horn flies, cattle lice and ticks. On dairy animals direct application of Geigy Methoxychlor "50" as a dust may effectively be used for the same purpose.

MITICIDE



CHLOROBENZILATE MITICIDE

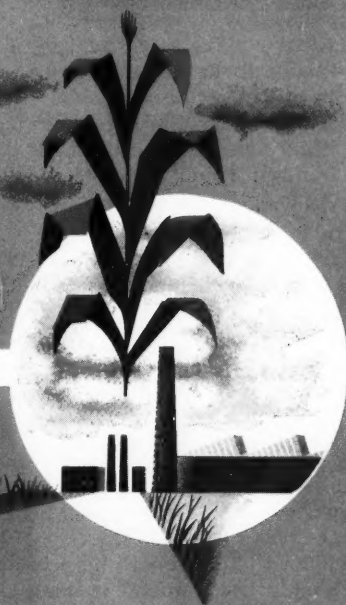
Safe, effective, economical miticide. Non-irritating to skin. Controls many species of mites, including phosphate-resistant strains on apples, pears, citrus, almonds, walnuts and other agricultural crops. Controls mites on azaleas, holly, spruce and other ornamentals and nursery stock, including clover mites in shrubbery and lawns around dwellings. Long residual action. Compatible with commonly used insecticides, fungicides. Will not harm bees under normal field conditions.

for agriculture and industry

HERBICIDES

SIMAZINE HERBICIDE

Pre-emergence triazine herbicide for use on corn. One application at planting time provides full season control of most annual broadleaf weeds and grasses. Also recommended as a pre-emergence herbicide for use with nursery stock. Relatively low toxicity to humans and animals. Non-corrosive to sprayer equipment. No drift hazard. Used as a non-selective pre-emergence herbicide at higher dosage rates, SIMAZINE may be applied late Fall or early Spring for year-long industrial weed control. Minimum of lateral leaching. Non-flammable. Available as wettable powder or granules.



ATRAZINE HERBICIDE

Highly effective, new herbicide for pre-emergence use on corn, which also shows outstanding promise as a post-emergence herbicide. One application provides season-long weed control. Relatively low toxicity to humans and animals. Non-corrosive to sprayer equipment. At higher dosage rates, Atrazine is used as a non-selective herbicide. Applied pre- or post-emergence around industrial sites and other non-cropped areas, it controls annual broadleaf weeds and grasses and many perennials.

METAL CHELATES

SEQUESTRENE® METAL CHELATES

For correction of minor element deficiency in ornamentals, fruit trees, vegetables, turf.

For correction of iron deficiency:

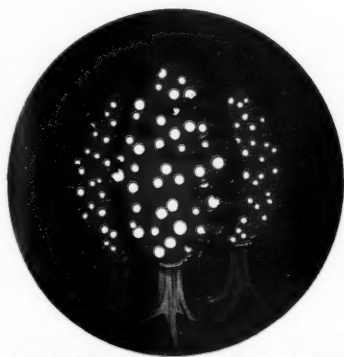
SEQUESTRENE 330 Fe IRON CHELATE—for use in alkaline or acid soils.

SEQUESTRENE 138 Fe IRON CHELATE—for use in calcareous, other highly alkaline soils.

SEQUESTRENE NaFe IRON CHELATE—for use in acid soils.

For correction of manganese deficiency: SEQUESTRENE Na₂Mn MANGANESE CHELATE

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ORIGINATORS OF DDT INSECTICIDES



GEIGY AGRICULTURAL CHEMICALS • Division of Geigy Chemical Corporation • Saw Mill River Road, Ardsley, N. Y.

MARKETING

SCENE. *A farmhouse. Behind a desk sits Mr. BYER, a granite-faced man of 50. He is trying to hide his boredom from his caller, JOE CELLAR, seated opposite him. They have been talking for 15 minutes.*

BYER: To be perfectly frank, Mr. Cellar, I don't see any reason for switching from our present supplier.

CELLAR: I can assure you, our product is as good as anything you'll find on the market.

BYER: But no better, right?

CELLAR: I wouldn't say that.

BYER: Then it *is* better. How?

CELLAR (*weakly*): We've never had a single complaint about its performance.

BYER (*consulting his watch and rising*): Tell you what. Why don't you leave your card and if anything turns up, I'll call you.

CELLAR (*rising*): Thank you. That'll be fine.

CELLAR *hands BYER his card, which promptly joins a drawer-full of others. Handshake. Exit JOE CELLAR.*

If you've ever starred in this all-too-familiar drama, you undoubtedly know the sequel, *Mr. Byer Never Called*.

Suppose your product *isn't* especially different from the competition's. What then?

Answer: sell the "fringe benefits"—those distinctive extras in and around your product that can often change a tired "No" into an enthusiastic "Yes!" Extras like better terms or delivery, your service policy, your company's facilities for helping customers in ways they may not realize.

These hidden plusses aren't hard to find. Usually, they've simply been around so long that they are taken for granted by the salesman and left to wither on the vine rather than to sow a harvest of more and bigger sales.

Consider how "fringe benefits" help you sell:

- ▶ They take the buyer's mind off price and put it where it belongs—on value.
- ▶ They build up his confidence in you by offering impressive proof that you know your company and *all* of its advantages to the buyer.
- ▶ They multiply your chances of hitting upon the benefit that looms largest in the prospect's mind.

In short, they make your product, your company and you yourself "different."

Let's take a look at some of these "hidden" plusses.

Easier payments. All other things being equal, your company's favorable terms, credit policies or financing assistance could make things *unequal*—in your favor.

"Rent this tractor for one month," says a farm machinery company. "If you decide to buy, we'll deduct the rental from the purchase price."

A sporting goods salesman suggests: "Stock up on our football helmets now; we'll bill you in 90 days. Meanwhile, cash in on three months' sales without laying out a penny."

Are *you* authorized to offer special billing arrangements, lease or rental plans, trade-ins, or other non-standard terms to the buyer? By all means, plug them for all they're worth!

THE

Free consultation. Help a man save money, increase efficiency or beef up his profits and you immediately rise high above your "order taker" brethren.

Salesmen for one firm arrange for their company's chemists to analyze a prospect's soil, draw up specific recommendations for the fertilizer that's "just right" for his needs.

Adds the sales manager, "We'll also examine and assess a farmer's present fertilizer. If it's doing the job, we'll say, 'Congratulations—there's nothing we can do for you.' But if we can honestly be of service, we'll tell him exactly how."

"In either case, our goal is the same—to help our customers save money, time and labor. And this is a plus they all appreciate."

Can *your* firm give your customers any special kind of aid? And, even if not expressly part of present policy, have you tried recruiting your experts in behalf of your customers and prospects?

Help in crises. The plus that persuades your very next prospect might be your company's off-beat or little-known facilities for handling S.O.S. situations.

Examples: "At night, phone operator 25." "If we haven't the parts you need, we'll locate someone who does." "24-hour-a-day, 7-days-a-week service."

What emergency problems is *your* firm equipped to handle?

Dependable back-up stock. Sometimes, simple availability can lower a prospect's raised eyebrow.

Crucible Steel Co. of America boasts 31 strategically located warehouses, each of which can offer in-stock delivery of approximately 16,000 specialty steel items, ranging from tool steels to stainless sheet and wire.

"Even if the item wanted by a Cleveland customer isn't available for some reason from the Cleveland warehouse," says branch manager Don Hall, "it wouldn't take long for the Cleveland people to find out which of our 30 other warehouses stock it—and to rush it to Ohio. This quick availability represents a major bonus for our customers because it means that they can reduce plant inventory, cut operating costs, free working capital and warehouse space."

If *your* company maintains an impressively large inventory, are you making the most of that asset?

Packaging. "Some of our most persuasive presentations center about the way our products are packaged," reports the sales manager of one fertilizer firm.

"For example, we offer our product in easily-handled 25-pound bags. A farmer can transport our fertilizer to where it's needed with a minimum of effort and equipment."

Until other companies followed the lead, salesmen of General Electric's electronic tubes had a field day highlighting the box in which each tube was packed.

HIDDEN PLUSses

in Your Product

While other brands often arrived smashed, GE tubes—isolated from shock and vibration by a snug-fitting hexagonal inner cell—always reached the customer in perfect working order.

Brown-Forman Distillers Corp. successfully sells the simplicity with which its cartons turn into eye-catching counter displays.

Any package feature that will add to your prospect's convenience or profit may make the difference between an order or a turndown.

For instance, does the package keep the product fresher? cleaner? freer from breakage or spoilage? Has it any novel uses after the product is consumed? Is it "stackable," thereby saving precious storage space? Does its size or weight reduce shipping charges—or make it easier to tote from storeroom to field? Can the customer see what he's getting?

A "Yes" to any of these questions—and you have the kind of "fringe benefit" that can outshout price.

Special customer service. The man who remains unmoved by your product story may "come to life" when informed of the unique personal service you are prepared to offer him. Frequently, this is the only plus you *can* offer. But what a difference it makes!

Case in point: international air travel, one of the most standardized "products" in existence. Rates are fixed; schedules are equally convenient; menus vary little. How, then can an airline set itself off from the competition?

"One plus alone gives us our competitive edge," says Peter R. Ossendorf, Eastern regional manager of Lufthansa German Airlines, "—personal service. For example, while the International Air Transport Association, to which we and most of our competitors belong, has spelled out the kinds of food we can offer at various price levels, we are in no way limited in our preparation of it. So that's where we work to excel. Our cuisine is one of our strongest selling points.

"Then there are the special foods we can offer our passengers merely by their making their wishes known in advance—sugar-free dishes for diabetics, kosher food, even low-calorie foods for dieters.

"We provide young mothers with bassinets for their infants, schedule flights at certain times of year for people who want to take their pets with them. Recently, we introduced a 'salmagundi' tour that gives the traveler a taste of everything, including a week-long cruise on the Adriatic Sea.

"It's to extras like these that we attribute our healthy growth in a most competitive field."

Personalized service can do more than nose out the competition. It can substantially increase the size of an order.

R. Parker Sullivan, vice president, merchandising,

Twelve potent closers that salesmen overlook are revealed in this, the sixth in an FC series on successful selling.

By TED POLLOCK

MARKETING

General Telephone & Electronic Corp., explains: "We don't consider ourselves just a telephone company; rather, we're in the communications business. Since no two customers have precisely the same problems, we must necessarily tailor our service to their needs.

"One customer may be plagued by noise; the answer for him would be a sound-booster telephone. Perhaps another must consult books and catalogs while on the phone; that calls for a hands-free speaker instrument. A third may need message-taking equipment; a fourth, special intercom facilities; a fifth, a combination of several devices.

"More than once, a man has called us with nothing more in mind than the installation of an additional extension phone, only to end up with an entirely revamped communications system—and grateful to the sales engineer who took the trouble to study and solve his problems."

What about the "optionals" and extras in *your* product line-up? Are you bringing them out as often as you should?

Complete line. If your company offers a full line, feature the plusses inherent in receiving many products from one central source: dependability, fewer salesmen to see, less paper work, a consolidated bill, perhaps mixed bulk-order discounts. Even banks have found this a potent selling point—"one-stop banking" . . . "all your financial needs served under a single roof."

Guarantees. "True—our price *is* the same, our product may look like the others, but look at the warranty you get. No charge for *any* replacement parts for a full 12 months." "It's guaranteed—not for 30 days, not for three months, but for two whole years." "If there's any mechanical failure, we'll give you another machine." "Unless you're completely satisfied, we refund your money." "This fertilizer will never cake."

Is *your* product covered by an "insurance policy"? Sell it!

Multiple benefits. Few people can resist a bargain. Show a man how he can get extra mileage out of your product and he's an odds-on favorite to buy.

Take the paper bath mat salesman who cracked the motel market wide open when he proved that his product also made a superior desk blotter.

Or, consider how salesmen for Pitney-Bowes, Inc.

THE IMPORTANCE OF SPEAKING UP

Even if your competitor *can* offer the same "fringe benefits" as you—the odds are, he *doesn't*! Your edge may come simply from taking the trouble to underscore them.

Example: the tractor salesman who, losing out to a rival, asked the customer why.

"Your competitor sends a man here to check on the machine every month for three months," answered the customer.

"B-b-but we do that, too!" the salesman sputtered.

"Ah, why didn't you say so?"

straight-arm the objection, "We don't carry on a big enough correspondence to warrant using postage meters."

"Our answer to that one," says branch manager D. E. Johnston, "is an impressive list of plusses. 'Quite aside from the savings on labor, Mr. Brown,' we say, 'think of these advantages: metered postage can't be lost or stolen; the machine does its own accounting—you know at a glance exactly how much you've spent on postage, how much you have left; because it's already canceled, metered mail skips certain post office procedures and gets to its destination faster than ordinary mail; and the message or symbol that you can stamp on every envelope along with the postage gives you valuable free advertising.'

"The combined weight of all these considerations frequently makes all the difference between a brush-off and a pay-off."

Are there any overlooked uses for—or advantages in—*your* product?

"Borrowed prestige." If your brand is widely advertised or known, this fact in itself may be of great sales value to your customer. Explain to him the dollars-and-cents value of being able to say that he uses Rolls Royce engines . . . Fisher bodies . . . whatever.

Can *you* honestly say, "Our name on your produce is worth real money"?

Delivery. Swift delivery can make a most effective difference.

Lufthansa, for example, employs several "super-cargos," men whose sole function is to accompany cargo and attend to all paper work while in the air. Result: no time wasted on the ground clearing customs, cargo gets to where it's going faster.

"Incredible as this may seem," explains cargo manager for North America, Joerg W. Paetow, "this can sometimes cut as much as three days off a package's in-transit time. For instance, if a shipment arrives at Idlewild Airport at 8 a.m. Friday, ordinarily customs clearance takes several hours. Before you know it, it's too late for that shipment to be delivered to its destination that day—it has to wait till Monday. But by getting all documents ready while the shipment is winging its way over the Atlantic, the cargo can be cleared in minutes and start on the final leg of its journey on Friday. For many shippers, this is a vital consideration."

Can *your* firm out-deliver the competition because of special systems? warehouse location? transportation facilities?

Corporate policies. "We accept no direct sales from your customers—we sell *only* through authorized distributors and dealers like yourself." That sentence has unlocked many a door for the sales staff of one seed company.

"We actually field-check your retailers before advising you what to stock," salesmen for a hardware manufacturer tell potential distributor customers.

Which of *your* company policies work to the customer's particular advantage?

The plusses are there. They've been there all along. You have only to dust them off to discover how persuasively attractive they can be. ▲



3 MEN DO WORK OF 4, and cut material handling costs 15% *in switch to Michigan Tractor Shovels*

By equipping standard 16 cu ft Tractor Shovels with $\frac{3}{4}$ yd buckets, Growers Fertilizer Co-operative, Lake Alfred, Florida, has cut handling costs 15 per cent.

Growers' problem had been a common one . . . how to put greater efficiency into a system where weighing, mixing, and truck loading all were completely automatic. Only in such Tractor Shovel operations as unloading box cars, storing material, and feeding hoppers could there be much improvement.

With this limitation, plant manager Ed Shores' first thought was to get bigger machines. It was about time to trade in his four old 15 cu ft Tractor Shovels anyhow. But an increase of even one size *range* would keep the Tractor Shovels from readily passing through aisles, box car doors, and among some of the 38 bins (which ranged from 40 to 500 tons in capacity).

Then, a different *make* of Tractor Shovel came to mind. This machine—a 16 cubic ft power shift-torque converter Michigan Model 12B—would help boost production simply by preventing

the end-of-shift fatigue that comes from constant clutching and declutching. Too, its extra cubic foot of capacity could up production—though only another 100 lbs or so per load.

That's when the key idea was born. Fertilizer is, after all, a relatively light material—the heaviest Growers Co-op handles weighs 110 lbs per cu ft. Perhaps the Michigan Model 12B could swing a bigger bucket, thought Mr. Shores. How about the standard Clark-built $\frac{3}{4}$ yarder? Fully heaped, it would carry 2230 lbs—470 lbs (27%) more than could the 16 ft bucket. Yet, its load would be well under rig's lift-and-carry capacity of 3,000 lbs. And its extra width, 4 inches, would cause no maneuverability problems.

A three-day on-the-job trial resulted. Michigan and the $\frac{3}{4}$ yd bucket performed "with highest honors." Loads weighed out at 2200 lbs or better. Each 40 ton box car was unloaded in about 1½ hours. Feeding the hopper from a stockpile 40 feet away, the 12B delivered 77 tons of fertilizer per 50-minute hour.

With the fatigue factor reduced, operator made more runs in a day.

Result . . . the Co-op ordered three new Michigans to replace the four old machines.

Today, the combination of eliminating one Tractor Shovel and getting more production from each machine has provided the company with an over-all cost saving of 15 per cent! Yearly output, with only 12 men, is up to 100,000 tons, 700 grades of fertilizer, per season.

Perhaps the Model 12B Michigan can give you similar economies. Test one in your plant for proof—using the size bucket, 6 to 27 cubic ft, which best fits your material, job conditions, and production needs. Write us to arrange the details.

Michigan is a registered trademark of
CLARK EQUIPMENT COMPANY
Construction Machinery Division

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EQUIPMENT**

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Take those big preseason savings on **LION® E-2** now!

*It's the one and only ammonium nitrate
you can safely store for big spring markup
and extra profit! Lion E-2 is free-flowing
when you get it...free-flowing when you
sell it...no matter how long you store it!*



NO CAKING... GUARANTEED. Lion E-2 prills won't break down, crumble or cake under the heavy weight of stacking in shipment or storage. E-2 is free of dust and fines... not affected by extreme temperature changes or humidity. You and your customers can buy now, store safely until used. Guaranteed storage-stable.



EASY-TO-HANDLE BAGS. Lion E-2 multiwall bags are specially coated with Monsanto Syton®—the antislip agent that lets you stack Lion E-2 higher... move it faster... handle it easier. It helps you save time, work and space... reduces material losses through breakage due to slippage.



TAKES LESS STORAGE SPACE. Lion E-2 has the greatest density of any ammonium nitrate on the market. It's less bulky... takes 20% to 25% less storage space. It saves you needed floor area. It isn't necessary to spread out E-2 in smaller stacks. With E-2 you can stack higher utilizing all available storage area, without fear of caking. You can safely stack E-2 higher.

NEW LION E-2

Always stores...

Always pours



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Photo taken at warehouse shows Lion E-2 stored in huge quantity (rows are stacked 27 bags high) with no danger of caking, shifting or sliding. Winter moisture won't cake Lion E-2 ... not even the bags on the bottom. Lion E-2 won't cake in your storage area either ... **we guarantee it.**

Order Lion E-2 Now ... Order Big ... Cash in Big!

MARKETING

Cyanamid's 'M

41 products for feeds

47 fertilizer products

27 insecticides, fumigants

weedkillers

nitrogen products

chemicals for food industry

A RECENT survey at the retail level found nearly 200 different products or package sizes of animal drugs and pharmaceuticals that were sold by the Agricultural Division of American Cyanamid Co. We list more than 41 products that are used by feed manufacturers as ingredients in making all types of animal feeds. We sell 47 grades and forms of fertilizer products, 27 insecticides and fumigants, not to mention weedkillers, nitrogen products and a line of chemicals for the food industry.

How is it possible for us to keep track of all these diverse products and to market them effectively—particularly when our product users are as diverse as our product line? Because of the apparent confusion resulting from our diversification superimposed on the heterogeneous business make-up of agriculture, it might seem impossible to apply an effective over-all marketing concept that is successful.

THE TOTAL MARKETING CONCEPT

Each marketing advance has increased our know-how and has helped today's businessmen realize that the business of business is the creating and fulfilling of product user needs and desires at a profit—the orientation of business to product user needs. This is *the total marketing concept*, and it applies generally to all industries, the highly diversified organizations as well as the single-line companies.

The truth is that if our business were not product-user oriented, we would strangle ourselves to death. Our diversification, and especially that part of it developed in recent years, would never have evolved if we had not been consumer-oriented.

The total marketing concept as we practice it is a two-phase affair. *Phase one* is the classical example of the total marketing concept. This consists of finding or creating the need, developing the product to fit the need and fulfilling the need at a profit. *Phase two* is the classical example turned backwards. That is, we often obtain another product while working on the first, or get a by-product—sometimes completely by accident. Then we have to turn the total marketing concept around and find or create the needs to go with the new product.

The story of Aureomycin® chlortetracycline illustrates the 2-phase approach—and shows how a company can successfully diversify through consumer orientation. As one of the early producers of penicillin, we became aware that the drug left a lot to be desired. What the medical profession needed, according to market analysis, was an antibiotic that would effectively deal with all types of disease bacteria and viruses.

d's 'MARKETING MIX'

By B. F. BOWMAN

Thus, we knew there was a need and found out what it was. All that was left was to develop the drug which would treat a broad spectrum of diseases, not just the few attacked by penicillin. And Aureomycin® was developed to fill that need. The drug itself is a monument to the late Dr. Benjamin Duggar, who found it by testing literally tens of thousands of molds grown from fungi found in every part of the country. Three years of extensive market analysis and patient and laborious work by scientists, marketers and production experts followed detection of the first strains in 1945. That brought us through the first phase of the marketing concept: Developing the product to fit the need.

We then had a yellow crystalline substance that would fight a broad spectrum of diseases, but next came the question: What else would it do? Market analysis then went into high gear, along with teams of scientists, technicians, and an army of others to answer the question. We now have 30 animal health pharmaceuticals for curing diseases in everything from canaries to Texas steers, plus 13 formulas used in feed to maintain health and promote growth in all types of livestock and poultry. That, then, is the second phase of the total marketing concept.

How does a large and diversified operation such as Cyanamid keep abreast of changing times? Here are two important ways:

► One of the most productive methods is through marketing research. Certainly, Cyanamid doesn't spend as much on market research as the \$20 million a year which it spends on laboratory research and technical development, but we believe we put more time and money into it than most companies of our type.

► Of tremendous value is having our salesmen call directly on leading farmers. In some cases, they do this to promote sales, but an equally important purpose is to keep our people informed of what our product user is doing and thinking and what his needs are. Calling on farmers is also a good source of product ideas.

Another question frequently asked is how we determine the "marketing mix". Of prime importance to us, of course, is the salesman. He is nearest the product-user focal point. Furthermore, we believe that each of our salesmen in the field is managing a part of our business. We therefore gear all of the elements of our marketing mix to helping each salesman carry out his managerial responsibility and enabling him to deal effectively with his territory's individual problems.

Our marketing mix includes the usual ingredients—product, selling by salesmen, advertising and public

relations, promotion and packaging. But we place *very heavy* emphasis on technical services and sales training. Since our sales problems are so diverse, our marketing mix varies from sales territory to sales territory and from product to product.

There are times when we use across-the-board national media and promotion, but usually our programs are pin-pointed to individual agricultural industries and areas. Here are 4 of our products and product-lines as examples of how it varies.

► Aureomycin® for livestock health and growth promotion in feed. This is sold to feed manufacturers; thus our marketing is oriented in that direction. Therefore, our technically trained sales force is the first line of attack, backed up by our technical service and scientists. We provide research and consultation on feeding problems, conduct field trials and demonstrations, and direct trade advertising to the feed manufacturer. In addition to this, however, we advertise to the farmer in a general way on the benefits from growth-promoting feed additives. In short, to the farmer we sell a concept. To the feed manufacturer we sell a product.

► Aureomycin® Mastitis suspension which cures mastitis. While the basic ingredient of this product is the same as the Aureomycin® sold to feed manufacturers, the market mix is different. The mastitis ointment is sold through wholesalers, distributors and farm supply outlets direct to the farmer. Here our advertising sells *our* specific product to the farmer. Obviously, technical service plays a subordinate role.

► Phosphate and nitrogen products fall roughly into 2 groups. One group consists of ingredient concentrates which are sold to fertilizer manufacturers who formulate them into finished products. The other group consists of finished fertilizer products sold through farm supply channels. The most important part of our phosphate and nitrogen marketing mix is a special technically trained sales force. As in the case of Aureomycin® for feed, the sales force works in close cooperation with our technical service men. The second ingredient in our fertilizer marketing mix is location of our production facilities; a very important ingredient. Strategic advertising, public relations and promotion are used, but not nearly to the extent that they are in the majority of products in our line.

► Cyanamid Special Grade Defoliant is a product based on our original Cyanamid compound which was developed 51 years ago. This product defoliates cotton prior to mechanical or hand picking. It is a packaged item sold through farm supply channels. Since the product is useful only when there is lush leaf-growth, the most important ingredient in Cyanamid Special's marketing mix is availability when and if needed. The

MARKETING

hardest job is to have it on hand at the right time, the right place, and in the right quantity.

So you can see we have no pat formula for developing marketing mixes. The nearest we come to having a formula is a reliance on problem definition—the heart of the total marketing concept. Here are some clues as to how our marketing mix problems are defined.

► Marketing research, including continuing and special tailor-made audits at various trade levels, analyses of changes in animal population data, analyses of changes in the economic status of various farmer groups, analyses of our marketing programs, and those of our competition, blind product tests and opinion surveys. Our scientists, meanwhile, continually check the technical strengths and weaknesses of our products versus those of the competition.

► From our sales forces we obtain continuing reports on changing conditions and needs and, *very important*, the salesmen's recommended action. The salesmen's recommendations are screened and improved upon by district managers and the managers of our five virtually autonomous regions. Great attention is given the recommendations of the 5 regional managers, each of whom manages our business in about 10 states.

► All this information is coordinated by 10 product managers and product supervisors. Briefly, each of our product managers and assisting supervisors functions as an operator of an individual business, each drawing up the total services of the Division and paying for his own particular share of the costs.

The author, B. F. Bowman, is marketing director of the Agricultural Division, American Cyanamid Company.



► The strongest clue we get is one of hindsight through expense control analysis and marketing research. From the latter, the product manager determines whether his marketing mixes have been successful. From the former, he tells whether fixed expenses stay in balance or go down, if profit is adequate, and if we are successfully removing obsolete products from the line and replacing them with products with growth potential. Thus he can determine the adequacy of his particular marketing mixes.

All of this can be summed up by saying that the product manager is continually defining and reviewing his problems. Thus, our entire operation is based on analysis of our problems and working from facts.

Our guiding influence is the concept that the business of business is the creating and fulfilling of product user needs at a profit. By this system, we hope we come close to accomplishing our several marketing objectives—but we know that at some time or other we utilize all of the marketing tools now available to us. ▲

Secrets of a Leader

By JOHN HARMS

THE STORY of American Cyanamid Company can be summed up in these words: Service to Agriculture. This phrase is the key to Cyanamid's growth from a single-product producer founded in 1907 to the manufacturer of the most diverse line of farm chemicals in this country today.

A recent survey of top chemical companies in the United States shows that American Cyanamid is the leader in farm chemical diversification. With twice as many products for agriculture as its nearest competitor, its product lines show up heavily in all major farm chemical classifications—pesticides, fertilizers, animal feed, and animal health.

Cyanamid's Agricultural Division—which handles everything from a 20-milligram tablet of Aureomycin to a barge-load of phosphates—produces and sells at present 41 products for animal health problems, 24 products for livestock and poultry feed, 47 product grades and forms of fertilizer (including a score of nitrogen solutions), 27 insecticides and fumigants, plus weedkillers, fungicides and a line of chemicals for the food industry.

This unparalleled diversification is rooted directly

in Cyanamid's simple formula for success in the highly competitive farm chemicals field—service. Its management will tell you that without a dedication to serving agriculture, present diversification would not have been possible. On the other hand, diversification has opened the door to still more service.

But both the potential for service and the scope of diversification would have been severely limited without a basic ingredient: Research. Cyanamid ranks high in the amount of time, energy, and money invested annually in research. A measure of this is the fact that the Agricultural Division devotes more than a half-million man hours a year to research and technical work.

At any given time, at least 120 tests are being run on actual commercial farms. At the same time, product evaluations are being conducted in many or all of 40 agricultural schools and colleges. Cyanamid's agricultural research grants this year will exceed a quarter of a million dollars. Its new agricultural research center at Princeton, New Jersey, will run under actual farm conditions, rather than as a show-place for dramatic displays.

It's small wonder that Cyanamid management

(Continued on page 61)

10 hours' work in an 8-hour shift!

That's the production advantage of the Yale Industrial Tractor Shovel

Here are the features that make the Yale Industrial Tractor Shovel outstanding...

PRECISELY CONTROLLED HORSEPOWER!

72 hp. 6 cylinder engine provides smooth power through matched torque converter and Yale torque transmission (fully automatic). One speed in both directions. Inching control permits delicate close-quarter maneuvering. Extra punch for impact loading. Accelerates to 13 mph. in 5½ seconds.

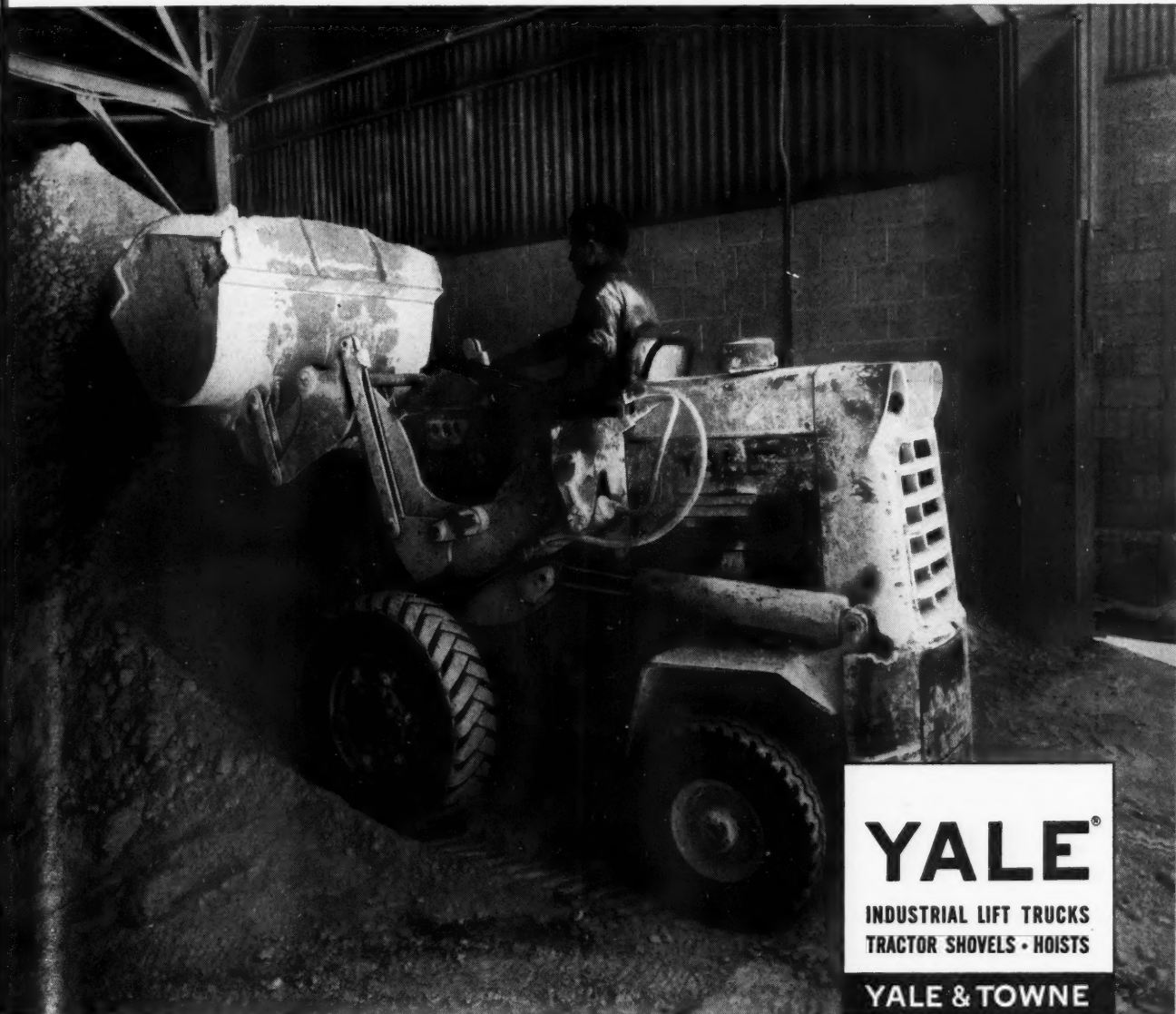
PERFORMANCE! 2500 lb. carry capacity. Exclusive 45° bucket tipback permits faster loading and lowest carry position for faster transport with minimum spillage. 6' dumping clearance permits dumping into bins and hoppers out of range of other—even larger—tractor

shovels. Shortest turning radius, too—only 73".

SAFETY! Safety-curve lifting mechanism members never rise alongside the operator. Front and back working lights provide extra security.

DEPENDABILITY! Rugged design • sealed brakes and electrical system • protected steering linkage • 10 ply tires—all adds up to more work at less cost...more production hours. Full range of buckets and attachments available.

Field applications prove that these features add up to 25% more work per hour—10 hours' work in an 8-hour shift. For a demonstration in your plant or complete information contact your Yale representative. Or write The Yale & Towne Mfg. Co., Yale Materials Handling Division, Phila. 15, Pa., Dept. YT 2-V.



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INDUSTRIAL LIFT TRUCKS
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Yale Materials Handling Division, a division of The Yale & Towne Manufacturing Company. **Manufacturing Plants:** Philadelphia, Pa., San Leandro, Calif., Forrest City, Ark.
Products: Gasoline, Electric, Diesel and LP-Gas Industrial Lift Trucks • Worksavers • Warehouse • Hand Trucks • Industrial Tractor Shovels • Hand, Air and Electric Hoists



NATIONAL AGRICULTURAL CHEMICALS ASSOCIATION

26th annual meeting



J. V. Vernon



L. F. Czufin



W. W. Dykstra



Roger Roth

Advertising, promotion and sales will come up for discussion the first day of NAC's convention, to be held in French Lick, Indiana



Robert S. Thompson (left), president of Thompson-Hayward Chemical Co., will speak on "Sales and Marketing." In photo he is discussing distribution of T-H warehouses with Hal Bunting and H. H. Howard of the company.

OCTOBER 21

9:30 a.m. Meeting called to order. Dr. Roger Roth, general committee chairman, Velsicol Chemical Corp.

9:45 a.m. *Presidential address:* Jack V. Vernon, vice president, Food Machinery and Chemical Corp.

10:15 a.m. *"Sales and Marketing of Pesticides,"* Robert S. Thompson, president, Thompson-Hayward Chemical Co.

10:45 a.m. *"Advertising and Promotion of Pesticides,"* L. F. Czufin, California Spray-Chemical Corp.

11:15 a.m. *Panel on Wildlife.* Moderator: J. Dreessen, NAC Staff. Members: W. W. Dykstra, Fish and Wildlife Service, U. S. Department of the Interior; Clarence H. Hoffman, USDA; Dr. Charles Lincoln, University of Arkansas; and a representative of one of the national wildlife conservation groups.

Open Discussion

12:45 p.m. Luncheon. Speaker: Dr. Earl L. Butz, Dean, School of Agriculture, Purdue Univ.



The French Lick-Sheraton



Charles Lincoln



C. H. Hoffman

6:30 p.m. Reception for members and guests.

7:30 p.m. Board of directors dinner meeting.

OCTOBER 22

Committee meetings as scheduled.

9:30 a.m. Golf tournament.

7:00 p.m. Annual dinner.

OCTOBER 23

Presiding: Charles H. Sommer, executive vice president, Monsanto Chemical Co.

9:30 a.m. Introduction of newly elected NAC President.

9:45 a.m. "NAC Works for the Industry" presented by NAC staff and committee chairmen as follows: Legislative—L. G. Gemmell; Public Relations—A. Northwood, Jr. Traffic—G. W. Wilson; Lawyers—G. T. Scriba; Technical Advisory—R. Barron.

10:45 a.m. "World Pest Control Developments," Dr. Charles E. Palm, Dean, College of Agriculture, Cornell University.

11:45 a.m. "H. R. 6436—How It Affects the Industry," J. A. Noone, NAC Association, and Justus Ward, USDA.

how to get to French Lick

RAIL. The Baltimore & Ohio R. R. serves French Lick through Mitchell, Ind. Two night trains from the East originate in Baltimore and can be boarded in Washington, D.C., and in Cincinnati, O., the following morning. From the west, the B&O schedule lists two trains originating in St. Louis. The Monon Railroad operates morning trains from Louisville and from Chicago to Orleans, Ind., its railhead for French Lick.

Arrangements may be made with the French Lick-Sheraton Hotel for transportation from Mitchell or Orleans.

AIR. Nearest commercial airport is at Louisville, Ky., about 67 miles from French Lick. Louisville is served by American, Eastern, TWA and Piedmont airlines.

TRANSPORTATION FROM LOUISVILLE, KY.

Rental cars. Hertz, Avis and National Rental Cars can be reserved either directly with the companies or through the airlines when you purchase your ticket. Two weeks' notice is requested. Approximate cost: \$10 per day plus 10 cents a mile.

Taxicabs. Louisville Taxicab and Transfer Co. will have available Yellow Cabs at the Louisville Airport and at the downtown Louisville Hotels. Rate from Louisville to French Lick is \$30 for one to five persons.

Buses. There are three Greyhound buses daily, each way, between Louisville and French Lick. Approximate cost: \$2.15 one way, \$3.91 round trip. NAC reports it has reserved a room at the Sheraton-Seelbach Hotel in Downtown Louisville for use as a meeting place for persons who wish to pool transportation to French Lick.

"FCMS"

"Marketing—Key to Future Profits" is the theme of FCMS November 16-17, at the Barbizon-Plaza, New York City; primary aim is to make you a constructive critic of farm chemicals marketing.

The Program

November 16, morning session, 9:00 a.m.

THE MEANING OF MARKETING

Marketing—A Policy of Profit Insurance

THE HONORABLE PHILLIP ALAMPI

Secretary of Agriculture, State of New Jersey

The Modern Marketing Concept and Four Steps to Acceptance of it

CHARLES E. ST. THOMAS

St. Thomas Associates

Coffee Break

Question and Answer Session

Luncheon, 12:30

afternoon session, 2:00 p.m.

MARKETING RESEARCH AND SALES PLANNING

Marketing Research and Its Importance to Farm Chemicals Manufacturers

MANUAL H. PARSEGHIAN

Account Executive, National Analysts, Inc.

How to Initiate Your Market Research Program

LEE HANOWER

Director of Market Research

Nitrogen Division, Allied Chemical Corporation

Adaptation of Research Data to Sales Planning

JOHN R. SARGENT

Partner, Cresap, McCormick & Paget

Coffee Break

Question and Answer Session

Informal Reception, 5:30 to 7:30

November 17, morning session 9:00 a.m.

ANALYZING PRODUCT DISTRIBUTION PROGRAMS

Responsibilities of the Sales Manager

L. S. KANIECKI

Manager, Chemical Sales, Tennessee Corporation

The Part Advertising Plays in Sales Growth

VERNON H. VAN DIVER, SR.

Publisher, Brad-Vern's Reports

Coffee Break

How to be a Constructive Critic of Your Present Marketing Program

Speaker to be announced

Luncheon, 12:30

afternoon session, 2:00 p.m.

Question and Answer Session

A MAXIMUM exchange of ideas between top marketing experts and members of the farm chemicals industry is the primary aim of the first FARM CHEMICALS Marketing Seminar, to be staged at the Barbizon-Plaza hotel in New York City, November 16-17.

Question and answer sessions will follow each panel discussion both days. Two luncheons, coffee breaks, and an informal reception are also planned with further exchange of ideas as the definite goal.

Formal sessions (see program at left) will be conducted by top marketing experts in the field.

Phil Alampi—secretary of agriculture in New Jersey and instigator of several major agricultural marketing programs—will lead off FCMS with an attempt to relate the success of poultry marketing program now underway in New Jersey to farm chemicals marketing.

The two-day event will feature three panels. The first will be a discussion of the *Meaning of Marketing*; the second, *Marketing Research and Sales Planning*, and the third, *Analyzing Product Distribution Programs*.

Major emphasis will be placed on *how* marketing can be the key to future profits in the farm chemicals field.

Registration is \$25 per person for all those associated with the industry and \$35 per person for all others. This includes two luncheons, a cocktail party, coffee and pastry breaks, plus a complete proceedings of the Seminar which will be distributed at a later date.

Hotel rates are \$10.50—\$15.50 for singles; \$16.50—\$19.50 for twins.

MERCHANDISING AIDS PROMOTION

Washington State Control Official proposes

A positive approach to pesticide problems

The author suggests that the industry do a "better job of house cleaning on poor trade practices" and outlines a positive public relations program

THE PESTICIDE industry is noteworthy. Seldom does it deliver to a customer less than the package label purports to deliver. It is infrequent that deteriorated stocks are left on the market. Occurrences are few in which chemical merchandisers refuse to honor legitimate damage claims. The industry is on top of new and needed research at all times. Historically, your cooperation with control officials is exemplary. You propose and support needed legislation.

Yet trouble is not unknown, you are well aware. Much of this fine record is nullified by activities within the scope of industry self-control.

THE SALESMAN—A 'HIGH VOLUME MAN' . . .

There seems to be little organizational control or discipline over salesmen. A high volume man, for example, with a history of indiscriminate sales stays on company employment rolls.

We have histories of salesmen making recommendations for products far above the actual requirement—to sell more material! Then they reverse themselves when selling to a price-minded customer by exclaiming what a good job a small amount would do—neither recommendation being approved, nor on the label. Nor, of course, will the recommendation be in writing.

You are aware, no doubt, of the statutes presently employed in some geographical areas designed to better control these salespeople. Do you believe that those areas cannot become more restrictive, or that localities presently free from control of poison salesmen will remain in status quo indefinitely, regardless of activities?

If you do, you are wrong.

The case of the salesman recommending products as being safe (whether for desirable insects, crops, or man) when actually they are not, needs no documentation. You all know of him—but, of course, he works for your competition, doesn't he? Or does he?

. . . BESET WITH CUTTHROAT COMPETITION

At the risk of weakening the impact I am attempting to make, I must, in fairness, pay tribute to all of

By ALLEN BAKER

the fine sales and field personnel who comprise by far the major proportion of the pesticide industry staff in direct public contact. The industry employs valuable trained, conscientious people in this area, who probably account for 90 per cent or more of the sales. Must you depend upon indiscriminate employees to capture the remaining 10 per cent?

If you must, you are being distinctly unfair to yourselves. Being unfair to ones-self is excusable, but being unfair to the sales force which does such a fine job for you is manifestly unreasonable. In effect, you place the burden on the salesman with a conscience to do a good, long range job of selling while he is in direct competition with the no-holds-barred man who works for today's market and lets tomorrow's be damned—and in fact is helping to damn tomorrow's market.

Advance notices, promotional literature, press, radio and TV advertising explain none of the precautions required while they describe the nearly miraculous benefits provided by your product. Judging from your sales pitch, you are students enough of human nature to know that customers are pretty apt to figure

Allen Baker is supervisor of the Grain and Chemical Division, Washington State Department of Agriculture. He points out that the opinions and suggestions in this article do not necessarily reflect those of the Washington State Department of Agriculture.



MERCHANDISING AIDS PROMOTION

they know the entire story from the literature.

Of course, the public is not faultless. They feel that they pay for control; therefore expect a control officer there when they open the container. That same public will soon demand that you pay for one to be there, if you are not cautious in your promotion.

The less candid you are, voluntarily, about the dangers of poisons, and the more you proclaim them as panaceas in your promotional material, the more the public is going to demand greater control.

The farm chemicals industry must soon realize that the intense competition which companies insist forces them into questionable (from a safety standpoint) merchandising practices is in turn forcing more restrictive regulation. This puts all companies back on the starting line together again, but only after having absorbed the cost of conforming to the regulations. Although few of the companies are industrial giants, most are sophisticated enough to conform to some sort of trade association code of ethics.

BEWARE OF "IT CAN'T HAPPEN HERE" ATTITUDE

Are you industry people ready to walk into the pitfall breweries once were in, when for "competitive reasons" they furnished their outlets with complete bar furnishings—and then had to seek legislation for relief? This, apparently, is the course now embarked upon by the pesticide business.

Already you supply the small consumer with "ready

applicators". Will you begin to supply commercial applicators with aircraft in order to assure an account? Reflect on some of the gimmicks, advertising and otherwise in the agricultural chemical and companion industries—and remember the slogan "it can't happen here!"

You, as an industry, have been very ostrich-like in your public relations; you seem to feel that the less some chemical with a few objectionable features is mentioned, the less the general public will balk. If it is good enough to sell, it has, in a given set of circumstances, (usually printed on the label) merit enough to out-balance the shortcomings or dangers it may have. Or else it ISN'T good enough or safe enough to sell.

COUNTER-INTELLIGENCE PROGRAM NEEDED

Where is your counter-intelligence program, to combat the quacks and cranks—not in your trade organs, but in general circulation?

The Association of American Railroads, Insurance Underwriters, private power interests, labor groups and many others are not afraid to tell the public how much it (the public) is indebted to that group.

Why don't you . . . compare life with billions of bugs and their ability to procreate and overrun mankind with the relatively small danger of the use of poisons as presently controlled . . . show figures on equatorial Africa (or any place you choose) and the incidence of malaria, sleeping sickness, infant deaths,

The author clipped these from newspapers in his area. They point up the need for better public relations.

Wheat, Fruit Growers Tangle Over Spraying

By V. B. BURT

Washington, D. C. — Washington's pesticide industry is in a tangle over wheat and fruit growers' claims to be the best of both worlds. The industry is in a tangle over wheat and fruit growers' claims to be the best of both worlds. The industry is in a tangle over wheat and fruit growers' claims to be the best of both worlds.

Careless Use Of 2,4-D Causes \$780,000 Damage

The State Agriculture Department Saturday issued the "Golden Rule" in a bid to stop the careless use of 2,4-D. The department said that the careless use of 2,4-D had caused \$780,000 in damage to crops and property in the state.

BUG EXTERMINATOR ALSO FATAL TO MAN

WASHINGTON (AP) — A pesticide which is used to exterminate bugs in homes and on crops, also can be fatal to man, a health official said today.

Threat To Bees From Sprays Riles Growers

The threat of damage to bees has been a major concern of growers for some time. The threat of damage to bees has been a major concern of growers for some time. The threat of damage to bees has been a major concern of growers for some time.

Damage Reported

Bees have been reported to be damaged by the use of certain pesticides. The damage has been reported to be significant in some areas.

Grape Growers Ask Relief From Herbicide

Grape growers are asking for relief from the use of herbicides. They claim that the herbicides are causing damage to their crops and property.

Yakima Bee Loss Studied

The loss of bees in Yakima is being studied. The study is being conducted by the state agriculture department.

Alfalfa Growers Seek Restriction on Sprays

Alfalfa growers are seeking a restriction on the use of sprays. They claim that the sprays are causing damage to their crops and property.

Bee Death Blame Set

The blame for bee deaths is being set. The blame is being set on the use of certain pesticides.

Grape Growers Protest Spray

Grape growers are protesting the use of spray. They claim that the spray is causing damage to their crops and property.

etc. before and after poison application . . . point out that irrigating an area naturally arid is just as much an act creating an imbalance of nature as killing a population of undesirable weeds? Use educational media other than your trade organs.

Don't just pat your competitor on the back and toast each other on what a good job you are doing for mankind—tell mankind what a good job you are doing for mankind!

Summarily, I suggest you do a little better job of house cleaning on poor trade practice before your neighbors—who are your customers—demand that regulatory agents clean it for you. I suggest that you defend your industry actively, from indiscriminate and unthinking attacks by cranks, rather than passively submitting to the damaging punishment to which you are subjected.

I suggest that rather than complaining behind your hand of sorry practices by competitors which are contrary to a trade code of ethics or to law, that you name names and give evidence to the appropriate authorities, and that you testify openly to the violation. Your control officer doesn't want minced, unspecific charges against unspecific organizations. He wants to know that you, or your association will back him up when the chips are down. If you don't give him this, don't expect him to wash your embarrassing underwear for you.

A SUGGESTED PUBLIC RELATIONS PROGRAM

Finally, I suggest that you institute an industry-wide positive and active public relations program. You have several areas to emphasize:

- a) disease, discomfort and famine without pesticides: in this area, can you visualize a series of well-illustrated, properly captioned, "before and after" photos in national circulation Sunday paper supplements and magazines, depicting, for example:
 - 1) the healthy, happy child, compared to the insect bite blemished, perhaps malaria ridden youngster
 - 2) stunted, wormy fruit contrasted with attractive, pesticide treated specimens
 - 3) heel fly infested meat and hide compared to infestation free products
 - 4) a weed free plantation versus one untreated with herbicides, or, perhaps an illustration of an infant under an airless, hot mosquito net, perspiring and uncomfortable, captioned—THE SALE OF MOSQUITO NETS HAS DROPPED OFF because now baby is protected from insect and heat discomfort by (this is the home-maker magazine approach)
- b) the antithesis of the "balance of nature" theme: Emphasize that nature is never really in balance, but always seeking equilibrium and *never* finding it—always adjusting but never becoming adjusted, while man's efforts with pesticides merely hasten and modify those adjustments to benefit mankind. Inform the public that formulating a pesticide neither creates nor destroys anything

NAC's Program and Plans

The current public relations programs of the National Agricultural Chemicals Association are based on two major lines of endeavor—wide distribution of the Industry facts book, "Open Door to Plenty," and showings of a service club slide program, "Pesticides—Boon to Mankind."

Both of these features have received favorable acceptance from influential individuals and organizations.

"Open Door to Plenty" is now in its third printing having been distributed to date to members of Congress, the press, radio and TV commentators, the medical profession, and federal and state agricultural leaders. In addition, a large number of individual requests for the booklet have resulted from favorable reviews and availability listings in leading trade journals and major farm papers.

"Pesticides—Boon to Mankind" tells the story of pesticides and their benefits in a simple but forthright manner. Since April, when it was first released, many showings have been made by NAC member company personnel and by federal and state extension workers. Requests for the program have totaled as many as fifty at one time during the past few months.

To create a more favorable understanding of the industry, its products, and its aims and objectives, a broader distribution of both the facts book and the slide program is planned to make the story available to as wide a segment of the public as possible.

not already existent—it merely brings together elements into effective forms. Point out that at one time in human transition soap and baby powder—both chemicals and in a sense pesticides—were unknown, yet no one would do without them today.

- c) the regulatory function in providing safety
- d) the testing program on pesticides before marketing
- e) safety of pesticides today as compared with the days of arsenicals, etc: Explain how modern pesticides are subjected to extensive testing as compared to the more "primitive" chemicals (leads, arsenates, etc.) of only a few years ago.

I am not an authority on public relations or advertising, but the possibilities do seem limitless. Parenthetically, I would suggest that since a program of this type would be relatively new, that a method be devised for evaluation, if these humble thoughts are worth the industry's consideration.

If I leave you with the angry feeling that I'm telling you how to spend your money, you're wrong. But I am *suggesting* a few ways to spend it. I'd rather see it spent those suggested ways than painfully extracted, like a rotten tooth, in the form of tax money for stiffer regulation.

MERCHANDISING AIDS

PROMOTION

Is your promotion EFFECTIVE?

Interviews with dealers, county agents and farmers can give you much of the information you need to write good, SPECIFIC promotion copy.

By F. E. HARTZLER

THERE IS A classic statement attributed to John Wanamaker, "I know that half the money I spend on advertising is wasted, but which half?" that will always be true of advertising. By the very nature of the brute, you are sending a lot of advertising to people who are not immediately interested in your product.

However, part of that waste can be eliminated. Copy that is well written will catch the eye of some of those potential customers and hold their interest.

For this there are four good rules:

- 1) Get a clear picture of the customer you are trying to reach.
- 2) Get a clear picture in your mind of his problems.
- 3) Tell your story in his terms—be specific.
- 4) Don't be afraid to re-run a good ad.

Just to complicate this a little and, perhaps, add some interest, let's suppose you had commissioned me to do a campaign for you. What would I do? That's a dandy question.

First, I would make a wild dash for the library—preferably one on an ag campus. Here I could get the following information:

- 1) Farm size
- 2) Soil types
- 3) Crops and changes in crops in the area
- 4) Livestock forecasts
- 5) Any and all figures on return on investment from the use of fertilizer
- 6) Fertilizer sales in the area

This would be a nice beginning and provide me with a fair background on the local area. Here, I am assuming that most of your sales will not be over an area larger than one state.

With this background, I would want to talk to your salesmen who are selling to your dealers. From these men I could find out your best, middle and worst dealers. Now would come the more detailed interviewing.

By talking to your best dealers, I could find out what appeals they were using with the most success—and how sales were being made. From the poorer dealers, I could learn what did *not* sell fertilizer, and what they felt were the real stumbling blocks to sales. From the sampling of all dealers I could learn what farmers wanted and what they did not want.

While talking with them, I would also be asking questions that would obtain like information concerning the area. This would make a nice comparison and check on the census. From them, too, I would be able to get a picture of the new customers we had to get.

For example, suppose that the majority of farms in the area were two hundred and fifty acres and 80 per cent of our sales were to farms of more than five hundred acres. In this case the group that we would have to reach is obvious.

Yet, with all this information, I do not, at this point, know a single thing about the customer except that he farms about two hundred and fifty acres. Now I need to find a dealer who has had good luck selling this type of farmer. If we are in real luck, we can find one. From him we can get the appeal or methods that he has used successfully in reaching the farmers of this size. It may be that the information that we get from him will prove to be an entirely different method of selling, applying, or some other factor. If this happens I will go immediately back to the top management to ask you whether you want to develop this new twist or not.

On the other hand, it is more likely that I will find that no dealer is doing more than a mediocre job of selling this customer. We work some more.

COUNTY AGENTS HOLD SOME FACTS

A short trip should be taken to visit the county agents in the area to learn from them the thinking about fertilizer among the farmers. Answers, if we can get them, to why people are using fertilizer and why they are not using it should help. While driving around I will drop in on a couple of rural school events and talk to the men and listen to groups of them talking. The livestock auction is another good place to listen for the general tone of the people you are trying to sell.

When this is over, a sample of fifteen or so might be drawn for personal interviews.

If you are interviewing for fertilizer, try selling grain bins. Since you are really not interested in selling the bins you can do a lot of good listening! Have your questions made out in advance and slip them into the conversation as it is convenient. If you should happen to get an order for a grain bin, turn it over to some deserving salesman.

By now you are thinking that this is a lot of work

just to write an ad. It is. But then I am trying to write an ad that will sell merchandise and not just take up space in the magazine.

With all this ground work completed, I should have a very clear picture of the customer in my mind and a pretty good picture of his problems. I should be able to set down a customer inventory like the one below:

Age: 45 years Married
Education: 9th grade
Children: 4
Car: 1 1956 model
Income net: \$1500
Equipment:

tractor
plows
disc
corn picker
drill

Acreage: 250 acre
Pasture 60
Corn 60
Oat 60
Legumes 60
House
and barns 10

Livestock: 100 hogs
50 steers

This could be and should be much longer when the interviews are finished. And with this, one can start to work.



Now, back to the ag campus. Somewhere on this campus must be a man or a group of men who could give me a better farm plan. A method of raising that farm income by shuffling crops, livestock, and machinery will be invaluable as a tool.

BY ALL MEANS, BE SPECIFIC!

Now we have an ad ready to write. We can do the third thing. We can be specific. We can talk to the customer we are trying to reach on his own terms. We no longer need to run the old classic piece of farm equipment applying fertilizer. That ad has all the customer appeal of an insurance ad showing the salesman receiving his commission check. We can get away from old baskets filled with corn showing yield increases that do not apply to the area we are trying to sell.

Let's try being specific. Since we are interested in farmers, let's have an illustration showing a farmer. We have three choices: before, during, or after. In this case let's take the *after*.

We need a headline that will catch and hold interest; there are a number possible:

"I Was Going Broke and Didn't Know It. Are You?"

"You Can Go Broke, Breaking Even on Two Hundred and Fifty Acres."

Or let's have him talking to his banker: "You Know If I Hadn't Changed, You'd Have my Place by Now." (with mortgage plainly in sight, marked paid.)

Beneath the headline, have the farmer tell about his old farm plan—have him state the changes that he made and what they meant. Then at the bottom of the ad: "see your.....Fertilizer Dealer or county agent." Throughout the ad the name of the fertilizer should be mentioned at least six times.

Or, another example of being specific. We have, let us say, had a real dry year. Then let's find out what happens when fertilizer is applied after a dry year. What changes should be made in application? Again use a farmer in the illustration, perhaps this time he can be discussing with his wife the fact that they ought to be able to buy that new stove next year with the new plan.

The rule is be specific. Know what the problem is. Have a world of information about your customers that is current and sound. Then meet his problems.

A good readability formula will help you check the copy. There are several good ones being used currently. For a simple gauge, try this: sentence length, seventeen word average; 130 to 140 syllables per one hundred words; six or seven personal nouns or pronouns per one hundred words.

And last, if you find that you have a really good ad or direct mailing piece, don't be afraid to use it more than once. A number of outstanding ads have been run and re-run. Old customers don't mind and the same good ad will attract new ones. You can gain from the repetition.

Writing good copy depends on these things: sound background in knowledge of the customer and his problems; meeting the problem in his terms; being specific. Then using a good ad to the fullest. ▲

1959 MERCHANDISING AIDS

Your sales story can be told many ways

DO YOU REALIZE that you may be hurting your sales volume simply because you are not taking advantage of the many merchandising aids that are at your disposal?

This month we're starting something entirely new—a listing of merchandising aids which are being used by farm chemical producers and suppliers.

This is only the beginning. This Listing is by no means complete. There will be many additions in the 1960 Listing and we solicit the cooperation of all companies in making this exclusive FARM CHEMICALS feature as worthwhile as possible.

This Listing contains material from basic producers and suppliers *only*. Our sample mailing to mixers and formulators did not produce enough significant material to warrant special emphasis at this time. It is hoped that this first annual Listing will spur the industry on to greater efforts in the coming year.

CUSTOMERS RESPOND TO APPEALS

Merchandising aids, if they are to be effective, should *command attention* and make the product sound *appealing* enough to buy. Many merchandising programs fail because those in charge failed to appeal to the *five senses*—seeing, feeling, hearing, smelling, and tasting.

Simply put, they failed to see the whole picture.

Appeal to these senses is brought about through a variety of aids. These include catchy slogans, counter displays, road signs, exhibits, folders, brochures, bag samples, sound-color movies, radio scripts, TV commercials, ads for farm and local papers, postcard and ad reprint mailers, flip charts, demonstrations, slides, film strips—*whatever the imagination can dream up!*

Frank S. Washburn, general manager, Agricultural Division of American Cyanamid Company, stated



the problem well when he spoke at the 25th anniversary annual meeting of the NAC a year ago in Savannah, Georgia:

"The secret of mass marketing is the fact that *first* you are dealing with a tremendous number of customers . . . *second*, the vast majority of these customers respond to predictable appeals. And *third*, the law of averages prevails so that the few who do not respond to a standard sales story are cancelled out by the many who do."

NO SHORTCUTS IN MERCHANDISING

Washburn pointed out that there are no shortcuts, push-buttons, or ready-to-wear solutions, to our problems.

"There are salesmen who think they have put in a good day when they show a slide film, hand out five copies of a printed folder and attend the sales meeting on time," he chided. However, he said that good salesmen who know their business, and know how to give *real service*, will be in as much demand 25 years from now as they are today.

"No one will have discovered a way to substitute direct mail for man power," he stressed.

Thus the materials in this Listing are meant to

supplement the story which salesmen and dealers have been telling all along. You may want to use a film, a set of slides—or a combination of many aids. Or you may develop your own home-made presentation from the ideas you gain from this material.

The first essential in designing a merchandising aid is that you must have a *good, solid reason* for using it. You can find out by going out in the field and talking with farmers. What is that it sells *them*?

When you're sure that you have the best approach possible to reach the people you want to influence, try it out on a few potential customers before you mass produce it. *Iron out the kinks, improve your presentation!*

A GOOD RULE TO REMEMBER . . .

In designing your merchandising aid—no matter what it may be—remember that the eye seldom focuses for long on one point in your presentation. It flits back and forth from one point to another *unless* you've arranged it to lead the eye from one idea to the next in orderly fashion.

Arrange your layout so that the eye sees whatever you want it to see *first* and keep it focused on those things which are of special importance to *you*.

One of the best merchandising programs we ran across in our survey work came from the West. The name Anchor (Wilson and Geo. Meyer & Co., Inc.) has become synonymous with service to dealers.

► Their new "Crop Quiz" ad series is designed to go "straight to the farmer's pocketbook" . . . gives actual

samples of crops that were grown for less with Anchor's phosphate product.

► There are 150 Scotchlite metal highway signs in selected areas to help build the Anchor name.

► "Crop Quiz" pads, handy tablets of each ad in the farm paper series, make it easy for dealers to just tear off a sheet for a handout or mailer.

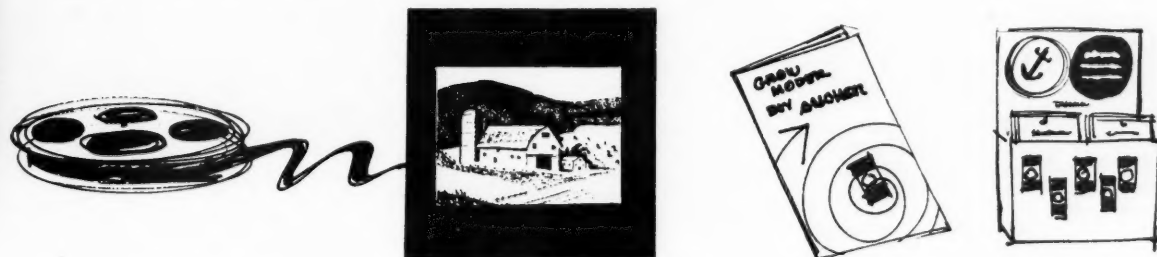
These services are in addition to a sound movie on phosphate fertilizers, radio scripts, "Grow Modern" folders, TV commercials, professional writing and art services, polyethylene bag samples, newspaper mats and other standard ideas used by wide awake concerns across the country.

VELSICOL'S REFRESHER COURSE

Velsicol Chemical Corporation announces a complete "Salesmen's Insect Control Refresher Course." This consists of nine individual lessons placed in a fibre cover. (See Insecticides section in Listing). Other features of their merchandising program includes attractive wall charts, flannelboards, movies, window streamers and a host of other items.

As a final word, we warn you not to hold any false illusions that these aids can do the whole job of selling farm chemicals. To you who have used them effectively, this isn't news. To you who have not utilized them, this warning can save you many headaches and much discouragement.

We welcome your ideas. If you have a special merchandising aid that is working for you, let us know about it! ▲



. . . 16mm films, filmstrips, color slides, wall charts, booklets and other aids

AMMONIATOR-DRIERS-GRANULATORS

Edw. Renneburg & Sons Co., 2639 Boston St., Baltimore 24, Md.

Booklet

RENNEBURG CONTINUOUS GRANULAR FERTILIZER PROCESS EQUIPMENT. How the process operates.

Miscellaneous Aids

DAVISON TRENTON CONTINUOUS PROCESS FOR GRANULATION. Reprint.

EXPERIMENTAL FERTILIZER PROCESSING UNIT AT GRACE'S WASHINGTON RESEARCH CENTER. Reprint.

Fertilizer Engr. & Equip. Co., Inc., Sturgeon Bay Road, Rt. 1, Green Bay, Wisconsin.

Miscellaneous Aids

ROTARY DRYERS. Folder, 8½" x 11". Dryers and general business activity.

F-M58-1. Folder, 8½" x 11" descriptive literature on belt conveyors.

F-M58-2. Folder, 8½" x 11" descriptive literature on chain mills.

F-M58-3. Folder, 8½" x 11" descrip-

tive literature on combustion chambers.

F-M58-4. Folder, 8½" x 11" descriptive literature on Preblender-Ammoniator-Granulators.

BAGGING

E. D. Coddington Mfg. Co., Milwaukee 9, Wis.

Folder

AUGER-MATIC. 8½" x 11", 3-page descriptive folder on valve bag packing.

Bemis Bro. Bag. Co., 408 Pine St., St. Louis 2, Mo.

16 mm Film

THE KING'S OTHER LIFE. Sound and color. 22 min. Traces the "life" of cotton, from growing through manufacture of bags and the re-use of bag materials in the home.

Richardson Scale Company, Clifton, New Jersey.

16 mm Film

BAGGING FERTILIZER. Color. 10 min. High speed bagging in 50-80-100 lb. sacks, paper or textile.

CONDITIONERS & ABSORBENTS

Johns-Manville, 22 East 40th St., New York 16, N. Y.

Miscellaneous Aids

FA-61A. 4-page folder on Celite Diatomite Fertilizer Coating and Anti-Caking Agent.

FA-58A. 4-page folder on Celite diatomite and Micro-Cel Synthetic Calcium Silicate Insecticide Carrier Absorbents.

CONSULTANT

Crippen Laboratories, 1500 Guilford Ave., Baltimore 2, Md.

Color Slides

CONSULTANT AND FARM CHEMICALS. 30 min. Shows how Crippen Laboratories, Inc. tests agricultural chemicals, assists in residue problems.

Folder

AGRICULTURAL CHEMICALS. 5½" x 8". Lists all standard farm chemicals and the fees to test for them.

FERTILIZER

Nitrogen Division, Allied Chemical

1959 MERCHANDISING AIDS LISTING

Corporation, 40 Rector Street, New York 6, N. Y.

16 mm Films

HOW TO USE NITROGEN SOLUTIONS. Sound and color. 14 min. The story of the teamwork which makes the use of Nitrogen Solutions such a back-saving, economical and efficient method of applying fertilizer.

MODERN SOIL BUILDERS. Sound, color, 13 min. Varied demonstrations viewed by farmers at Farm Progress Show.

MAN AGAINST HUNGER. Sound, color, 14 min. How man's wasteful practices deplete the soil.

USING FERTILIZER IN IRRIGATION WATER. B & W. 5½ min. "Fertilgation" mixes nitrogen with water, feeds it to otherwise inaccessible crops through irrigation ditches. Step-by-step description of new process of modern science at work in the field.

Filmstrip

GREEN PASTURES. Sound, color. 17 min. Five steps to higher corn profits through fertilization.

Spencer Chemical Company, Dwight Building, Kansas City, Mo.

16 mm Films

GEORGE TACKLES THE LAND. Color, 27 min. Combines humor with fertilizer education.

INFINITE HARVEST. Color, 28 min. Story of how chemicals help man provide for an infinite harvest.

FERTILIZER FIRST. 13 min. Dramatizes contributions which the company has made to the fertilizer industry since it began commercial operation in 1946.

Filmstrips

FIVE TESTED STEPS TO MAXIMUM PROFIT CORN. Free. Covers 5 important steps to efficient corn growing. Script included.

THE COASTAL BERMUDA GRASS STORY. 54 frames. Free. Outlines key steps to growing coastal Bermuda grass. Script included.

Slides

CORN. Kodachromes, 50 slides.
COTTON. Kodachromes, 46 slides.
SOUTHEAST PASTURE. Kodachromes, 50 slides.
MIDWEST PASTURE. Kodachromes, 40 slides, 40 min.

These slide sets all deal with better crop practices from planting and fertilization through yield time.

THE ROAD TO PASTURE PROFITS. 39 slides. Covers need for and importance of pasture improvement.

THE STORY BEHIND MIXED FERTILIZERS. 58 colored slides. Shows how nitrogen is supplied for mixed fertilizers; how phosphorus is supplied; how potash is supplied; how mixed fertilizers are manufactured.

Smith-Douglass Co., Norfolk, Virginia.

16 mm Film

LIFE OF THE SOIL. Color and sound. 40 min. A sound fertilization program explained.

Western Phosphates, Inc., Box 893, Salt Lake City 10, Utah.

16 mm Film

MOUNTAIN OF LIFE. Sound and color. 24 min. The story of phosphate, told in a dramatic manner. Has broad appeal—for farmer and classroom audiences.

FERTILIZER PLANTS

Chemical Construction Corporation, 525 W. 43rd. St., New York, N. Y.

16 mm Film

CHEMICO BUILDS A UREA PLANT. Sound and color. 18 min. The story of the design and construction of a urea plant.

HERBICIDES—INSECTICIDES

American Cyanamid Company, Agricultural Chemicals Division, 30 Rockefeller Plaza, New York 20, New York

16 mm Films

PRELUDE TO PLENTY. Sound, color 25 min. Shows insect control with malathion.

ROOTS AND ALL. Sound, color, 15 min. How Amino Triazole works as a weed killer.

California Spray-Chemical Corp., Lucas St. & Ortho Way, Richmond 4, California

16 mm Films

KEEP AMERICA GROWING . . . QUALITY FRUIT. Sound, color, 30 min. Covers insect and disease control problems on deciduous fruit.

KEEP AMERICA GROWING . . . QUALITY FOOD & FIBRE. Sound, color, 30 min. Covers major vegetable and fibre crops grown.

Climax Molybdenum Company, 500 Fifth Ave., New York, New York

Filmstrip

MOLY-GRO. Sound, color, 15 min. Use of Molybdenum as a trace element.

Cooperative Seed & Farm Supply Service, Inc., Division of Southern States Cooperative, Richmond, Va.

Folder

A NEW PROTECTIVE PROGRAM AGAINST INSECTS AND DISEASES. Explains advantages of Unico 1, 2 & 3.

Miscellaneous Aids

LETTER TO THE READER'S DIGEST. In answer to recent articles on pesticides.

Eastman Chemical Products, Inc., 260 Madison Ave., New York 16, N. Y.

16 mm Film

THE CASE OF THE DISAPPEARING POISON. Color, sound. 7 min. Describes how insecticides containing tetraethyl pyrophosphate effectively control a wide variety of insects which attack fruit and vegetable crops, yet break down into harmless compounds 48 hours after application.

Miscellaneous Aids

EFFECT OF FERTILIZATION ON COLD DAMAGE. (Reprint). Comparison of effect of cold on trees receiving plant food applications containing and not containing manganese.

Dow Chemical Corp., Townsend St., Midland, Michigan

16 mm Films

THIEF IN THE SOIL. Sound, color, 14 min. Nematode problem and control.

THE ENEMY UNDERGROUND. Sound, color, 12 min. Johnson grass control in cotton.

QUACK GRASS—THE PERENNIAL GUEST. Sound, color, 17 min. How to control quack grass chemically.

General Chemical Div., Allied Chemical Corporation, 40 Rector St., New York, N. Y.

Filmstrips

GREEN PASTURES. Sound, color, 22 min. The story of modern grassland farming.

PESTS OR PROFITS. Sound, color, 22 min. How to control insects.

Hooker Chemical Corporation, Box 344, Niagara Falls, New York.

Miscellaneous Aids

OLDBURY BRAND SODIUM CHLORATE. 6-page leaflet, explaining weed killer.

McLaughlin Gormley King Company, Inc., 1715 Fifth St., S. E., Minneapolis 14, Minn.

Technical Bulletins

INSECTICIDE SPRAYS. Specification sheets on 16 products. 8½" x 11".

NON TOXIC AND LOW RESIDUE AGRICULTURAL INSECTICIDE CONCENTRATES. Facts about Pyroicide Multicide, the double-purpose insecticide. 8½" x 11".

MGK REPELLENT 326. Use of repellents in cattle sprays, 8½" x 11".

MGK REPELLENT 11. Use of repellents in cattle sprays, 8½" x 11".

Michigan Chemical Corporation, St. Louis Mo.

Miscellaneous Aids

OVER-THE-COUNTER AND STUFFER FOLDERS: Pestmaster Soil Fumigant-1 for the control of imported fire ants and cut ants. Pestmaster Soil Fumigant-1 for treatment of nursery seed beds and greenhouse soil. Pestmaster Methyl Bromide for Grain Fumigation. Pestmaster Methyl Bromide Soil Fumigant for tobacco seed beds.

Niagara Chemical Division, Food Machinery & Chemical Corp., 100 Niagara St., Middleport, N. Y.

Catalog

CROP INSECT IDENTIFICATION. 8½ x 11".

S. B. Penick & Company, 100 Church St., New York 8, N. Y.

Catalog

FARM CHEMICALS. 40-page catalog covering the products of the company's Farm Chemical and Insecticide Division.

Shell Chemical Corporation, 50 W. 50th Street, New York 20, N. Y.

16 mm Film

THE RIVAL WORLD. Sound and color. 25 min. An award-winning motion picture telling of the never-ending struggle for survival between man and the disease-bearing, crop-destroying enemy insects.

FARM CHEMICALS

Sinclair Refining Company, Farm Sales Dept., 600 Fifth Ave., New York, N. Y.

16 mm Film
500,000 TO ONE. Color, 25 min. Insect control.

Standard Oil Company, 910 South Michigan Ave., Chicago 80, Illinois

16 mm Films

These films are available, but there is no information on running time or descriptions.

Killing Weeds with 2,4-D. Common Pests of Home and Garden. Garden Insects. European Corn Borer, Cutworm Control. Spittle Bug Control. Cable-type Back Rubbers (silent).

United-Heckathorn, 600 South Fourth St., Richmond, California.

Miscellaneous Aids

TOLERANCE FOLDER. Wallet-size. Gives limitations of days prior to harvest. Revised with up-to-date tolerances including the newer pesticides.

Velsicol Chemical Corp., 330 E. Grand Ave., Chicago 6, Illinois.

16 mm Films

GOODBYE, MR. ROACH. Sound, color 10 min. Shows cockroaches, their habits and how to control them.

GOODBYE, MR. ANT. Sound, color, 13½ min. Covers the life cycle, habits and control of ants.

Flannelgraph Kit

MRS. ANT, THE ALL-AMERICAN PEST. Covers life cycle, habits and control of ants. Contains 28 flannelgraph pieces. (No flannelboard.)

Wall Chart

USES OF HEPTACHLOR. 4' x 3'. Features 32 illustrations showing crops and insects attacking crops, including 79 accurate drawings of individual insects. Ideal for the trade and adult and student education.

Salesmen's Insect Control Refresher Course

INSECT CONTROL. 8½" x 11". Consists of 9 individual lessons placed in a fibre cover. Deals with all insecticides. Designed primarily for distributors and dealers, but is ideal for use as a reference by county agents, vo-ag teachers and others. Subjects include: types of insecticides their uses, insecticide formulations, how to apply liquid insecticides, how to apply dry insecticide formulations, insect identification, and safety in using insecticides.

Folders & Booklets

HARVEST MORE WITH HEPTACHLOR; Eastern U. S., 3½" x 6½". Habits, damage and control, alfalfa weevils.

HARVEST MORE WITH HEPTACHLOR; Western U. S., 3½" x 6½" Habits, damage and control, alfalfa weevils.

KILL CUTWORMS AND ARMYWORMS. Cutworms and Armyworms. 3½" x 6¼". Habits, damage and control.

KILL CORN ROOTWORMS. Corn Rootworms. 3½" x 6¼". Habits, damage and control.

KILL BOLL WEEVILS AND OTHER COTTON INSECTS. Boll Weevils, Cotton Fleahopper, Thrip, Rapid Plant Bug, Tarnished Plant Bug, Cutworm, Armyworm. 3¼" x 6¼". Habits, damage and control.

EARLY SEASON INSECT CONTROL CUTS COTTON GROWING COSTS. Kill cotton insects. Cotton insects. 3¼" x 6¼". Habits, damage and control.

BOOST GROWTH POWER AND PROFITS WITH HEPTACHLOR-FERTILIZER MIXTURES. Soil Insects. 8½" x 11". Habits, damage and control.

FOR BIGGER CLOVER AND CASH CROPS, USE HEPTACHLOR GRANULES. Soil Insects—Sweet Clover Weevil. 3¼" x 6¼". Habits, damage and control.

FOR LASTING GRASSHOPPER CONTROL—Grasshoppers 3½" x 6¼". Habits, damage and control.

MOSQUITO CONTROL WITH HEPTACHLOR. Mosquitoes. 3¼" x 6¼". Habits, damage and control.

HEPTACHLOR CONTROLS ROOTWORMS ON PEANUTS, Rootworms. 3½" x 6¼". Habits, damage and control.

SOIL INSECTS IN YOUR AREA AND WHAT YOU CAN DO ABOUT THEM. Variety of Soil Insects. 3¼" x 6". Habits, damage and control.

KILL SPITTLEBUGS WITH HEPTACHLOR. Spittlebugs. 3½" x 6¼". Habits, damage and control.

GROW MORE AND HIGHER GRADE POTATOES. Wireworms, potato beetles, flea beetles. 3½" x 6¼". Habits, damage and control.

Streamers

ALFALFA WEEVILS TAKE ¼ OF YOUR CROP. 26" x 10¾". Form 511-1.

SAVE THE TOP OF YOUR CROP—KILL FORAGE INSECTS, 26" x 10¾". Form 511-2.

STOP THE GRASSHOPPER PLAGUE, 26" x 10¾". Form 511-3

KILL SPITTLEBUGS—GROW MORE, HIGH PROTEIN ROUGHAGE! 26" x 10¾". Form 511-6.

BOOST GROWTH POWER & PROFITS; INCREASE YIELDS; SAVE TIME AND WORK! 27" x 11". Form 511-7.

PUT OUT IMPORTED FIRE ANTS, 26" x 11". Form 511-11.

KILL BOLL WEEVILS & OTHER COTTON INSECTS, 10" x 22" (Vertical). Form 511-11.

GROW MORE AND HIGHER GRADE POTATOES, 27" x 11½". Form 511-14.

SOIL INSECTS EAT UP PROFITS, 25½" x 10¾". Form 511-15.

KILL SOIL INSECTS, 12" x 30" (Vertical) Form 511-21.

KILL INSECTS WITH HEPTACHLOR, 12" x 30" (Vertical). Form 511-23.

MARKETING ORGANIZATION

Wilson & Geo. Meyer & Co., 333 Montgomery St., San Francisco, Calif.

16 mm Film

MOUNTAIN OF LIFE. (See Western Phosphates under FERTILIZER).

Miscellaneous Aids

HOW TO GROW MONEY WITH PHOSPHATES. "A short course for Anchor dealers." Explains a myriad of Anchor

sales aids—from the film mentioned above to polyethylene bag samples.

ANCHOR "CROP QUIZ" PADS. Handy tablets of each ad in "Anchor Crop Quiz" series. Just tear off a sheet for a handout or mailer. Pads cover 1) legumes, 2) vegetables (onions), 3) sugar beets, and 4) small grains (wheat).

MATERIALS HANDLING

Clark Equipment Company, Construction Machinery Div., Marketing Services, Benton Harbor, Mich.

16 mm Films

YARDAGE PLUS. 17 min. Tractor shovel applications. 150 tons. 15 min. Tractor shovel applications.

BONUS BUCKETS. 17 min. Tractor shovel applications.

MEN AND MACHINES. 22 min. Manufacturing and testing, filmed in Clark plants.

PROFITABLE APPLICATIONS OF THE 180. 16 min. Tractor dozer applications.

A MATTER OF RECORD. 20 min. Tractor shovel applications.

Highway Equipment Company, 616 "D" Ave., N. W., Cedar Rapids, Iowa.

Booklet

YOUR LAND IS DIFFERENT. 5½" x 8½", 12-page booklet on the merits of bulk fertilization.

Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

16 mm Films

PATHWAYS TO PROFITS. Sound, color. 12 min. Shows how Trukveyors in-the-floor conveying systems solve many problems of handling merchandise shipments and reduce operating costs.

The Yale & Towne Mfg. Co., 11,000 Roosevelt Blvd., Philadelphia, Pa.

Booklet

HOW BOOK. Shows detailed method of cutting the costs of materials handling and additional ways to increase production.

MISCELLANEOUS EQUIPMENT

Gotcher Engineering & Manufacturing Co., Box 721, Clarksdale, Miss.

8 mm Film

THE STORY OF WEED CONTROL. Color. 15 min. The entire story of weed control, from land forming to harvest.

Slides

FLAME CULTIVATION. Color. 50 slides. A story of the practices of flame cultivation, its advantages and methods used. "Very unusual presentation."

Nordberg Manufacturing Company, Milwaukee, Wis.

Miscellaneous Aids

SYMONS V-SCREEN. (Bulletin 243). Explains sizing, dewatering, dedusting, cleaning and washing.

PHOTO SERVICE

Kriner Photo Service, 216 N. Carlisle St., Greencastle, Penna. (Entomologist and photographer).

Color Slides

INSECTS. Kodachrome. Close up pic-

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tures of the various stages of insects attacking fruits and vegetables, forage, etc., as well as typical injury to crops.

PROTECTIVE EQUIPMENT

Mine Safety Appliances Co., 201 North Braddock, Pittsburgh 8, Pennsylvania
Booklet

RESPIRATORY PROTECTION. 8½" x 11". Covers respirators, masks, and oxygen breathing apparatus.

Willson Products Div., 2nd & Washington Sts., Reading, Penna.

Folder
PROTECT YOURSELF. Personal safety equipment information.

RODENTICIDES

d-Con Division, Sterling Drug Co., 1450 Broadway, New York 18, New York.

16 mm Film

STOP RATS FOREVER. Sound and color. 17 min. Portrays the problem of rats around the farm and home. Shows how to use Warfarin to control them.

Booklets

R-DAY ON THE FARM. 8 pages. Farm sanitation tips. Suitable for classroom or campaign use.

R-DAY AMERICA. Community rodent elimination program.

BULLETINS NO. 1 & NO. 2.—Baiting instructions for control of rats and mice.

Wisconsin Alumni Research Foundation, 506 N. Walnut St., Madison 1, Wisconsin.

Filmstrip

WIN THE WAR AGAINST RATS. 35 mm. Discusses rodent control.

Miscellaneous Aids

GET RID OF ROBBER RAT. Window streamer for dealers, 23" x 14".

CLEAN GRAIN MEANS MORE MONEY. Rodent control poster, 12" x 18".

EACH RAT COSTS YOU \$20. Stuffer, 7" x 4" on rodent control in clean grain program to be used by dealers.

THE VILLAINS AMONG US. Flannelgrams and flannelboard, plus suggested script dealing with rodent control—for use in lectures and in TV presentations.

RAT AND MOUSE CONTROL GUIDE AND FACT BOOK. 24 pages on control of rats, intended for agricultural leaders in educational work.

MICE IN BUILDINGS. 15 page booklet on control of mice.

RAT CONTROL WITH WARFARIN. 4-page educational literature for agricultural leaders and classroom use—as well as for all persons interested in rat control.

RAT AND MOUSE CONTROL—STEP BY STEP. 22-page demonstration manual for instruction in use of warfarin.

SOLVENTS

Amoco Chemicals Corporation, 910 South Michigan Ave., Chicago.

Miscellaneous Aids

PANASOL AROMATIC SOLVENTS FOR INSECTICIDES. Bulletin No. A2. 24 pages.

Data on solubilities of various insecticides in the different PANASOL Solvents, specifications, typical inspections and data on low phytotoxicity of these solvents.

SPRAY ADJUVANT

Colloidal Products Corporation, 100 Gate 5 Road, Sausalito, California.

Miscellaneous Aids

COMPATABILITY CHART OF SPRAY CHEMICALS.

MISCELLANEOUS AIDS

Agricultural Laboratories, Inc., 1147 Chesapeake Ave., Columbus 16, Ohio

Kit

LEGUME-AID INOCULANT DEMONSTRATION KIT.

DeKalb Agricultural Association, Inc., DeKalb, Illinois

THE CORN BORER—GANGSTER OF THE CORN FIELD. An educational film on the origin, habits and control of the European corn borer.

Note: A syllabus is furnished with each slide film.

Farm Film Foundation, 1731 Eye St., N. W., Washington 6, D. C.

16 mm Film

MAN AGAINST HUNGER—Color, 14 min. How anhydrous ammonia is making it possible for fewer farmers to produce larger crops.

National Agricultural Chemicals Ass'n., 603 Associations Bldg., 1145 Nineteenth St., N. W., Washington 6, D. C.

16 mm Film

CITY OF TREES. Sound, color, 5 min. Chemical control of pests.

Slides

PESTICIDES—BOON TO MANKIND. Color, 25 min. Story of Pesticides.

Booklet

OPEN DOOR TO PLENTY. 64 pages, illustrated.

National Plant Food Institute, Film Service, 1700 K. St., N.W., Washington 6, D.C.

16 mm Films

CASH IN ON GRASS. Sound, color, 22 min. How the livestock producer can derive greater profits from his pastures.

Booklets

WHAT IS FERTILIZER? 14 pages. Illustrated.

THE PROOF IS IN THE PUTTING. Leaflet. How much fertilizer to use.

CATALOG OF SLIDES. Describes 35 mm slides on fertilizer distribution equipment.

METHODS OF APPLYING FERTILIZER. 20 pages. Illustrated.

PLANT FOOD REVIEW. Free quarterly magazine.

CASH IN ON CORN. Sound, color, 18 min. How to produce top corn yields and profits.

MAKING THE MOST OF A MIRACLE. Sound, color, 27 min. Basic story of plant nutrition.

THE BIG TEST. Sound, color, 15 min. How to take a soil sample properly.

WEATHER OR NOT. Sound, color, 21 min. How sprinkler irrigation plus fertilizer can boost crop profits.

WHAT'S IN THE BAG. Sound and color, 17 min. How plant foods are produced and their functions in plant growth.

Slides

List of 8 slide sets describing fertilization. COLOR SLIDE CATALOG. Nutrient-deficiency symptoms in plants.

USE THE SOIL TO IMPROVE THE SOIL. Profitable crop production.

THE SOIL THAT FEEDS YOU. Illustrated, 40 pages.

OUR LAND AND ITS CARE. Illustrated, 72 pages. Story of soil and how to keep it productive.

HOW TO TAKE A SOIL SAMPLE. Step-by-step pictorial directions. (Chart also.)

Fertilizer Salesman's Handbook
A day-to-day partner of fertilizer salesmen and dealers.

Nitragin Company, Inc., 3101 W. Custer Ave., Milwaukee, Wisconsin

Slides

NITROGEN FIXATION BY LEGUMINOUS PLANTS. Color, 10 slides, script commensurate, 15 min. Describes inoculation of legume seeds with Nitragin fixing bacteria—Why and how it is done. Free loan for one week or can be purchased at cost, \$2.00.

Northrup, King & Co., 1500 Jackson St., N. E., Minneapolis, Minnesota

Folders

NOCULIZED SEED. Explains process of pre-inoculating legumes.

NORTHROP KING SEED PRODUCTS. Describes all Northrup King seed products.

The Venard Organization, Peoria 2, Illinois

16 mm Film

THE COUNTY AGRICULTURAL AGENT. Sound, color, 14 min. Portrays the events in the life of a typical county agricultural agent as he goes about his job as coordinator of the Agricultural Extension Program designed to help the people in his county.

THE VO-AG TEACHER. Sound, 14 min. True story of one vo-ag teacher's part in affairs of a midwestern community.

Panogen Company, Div. of Morton Chemical Co., 110 North Wacker Drive, Chicago 6, Ill.

16 mm Film

THE RED SEED. Color and sound. 27 min. Seed treatment in Sweden.

Miscellaneous Aids

BENEFITS OF A MODERN SEED TREATMENT. 5" x 7" booklet on seed treating.

Phillips Petroleum Company, Bartlesville, Okla.

16 mm Film

THE OTHER SIDE OF THE FENCE. Color and sound. 22 min. Explains the relationship of soil to animal and human nutrition. Dr. William A. Albrecht, chairman of the department of soils at the University of Missouri, narrates.

PVA

latest packaging film

By PETER C. CROLIUS

THROW the whole pesticide package in the spray tank?

Why not—if the package is made of PVA. It's the latest idea in pesticide containers: They dissolve in water and other liquid diluents.

Polyvinyl alcohol industrial packaging films offer a new sales horizon for pesticide formulators and manufacturers—perhaps later for fertilizer producers. According to Reynolds Metals Company, Richmond, Va., prime producer of PVA films, biggest advantage of soluble packages is that pesticide handling dangers will be cut to a minimum. Other advantages are pre-weighed packages, mixing ease, and the sales potential for the growing-but-untutored home garden market.

Reynolds is quick to point out, though, that further agricultural testing must first be done before the film goes on the market. For instance, while PVA films dissolve completely—within 60 seconds in water—kind and degree of agitation may shorten or lengthen this dissolution period. It is not yet known what degree and length of clogging may occur in spray nozzles: little if any, say Reynolds testers, but further experimenting will tell the story.

Optimum package size for pesticides has yet to be determined. Obviously, the larger the container, the lower the unit cost of the pesticidal chemical. On the other hand, a large package would lose its solubility advantage if division were necessary. Probable answer: small units of chemicals in PVA containers with operator attaining amount desired by adding smaller increments.

PVA-packaged items have been on the home market for about a year. The housewife can now buy in many parts of the country a detergent called *Toss*. Packed

in boxes containing 12 soluble, pre-weighed packets, *Toss* is designed to cut down waste. Seamless Rubber Company, New Haven Ct., makes use of Reynolds-produced films by packaging the starch lubricant *Ezon* for hospital use in surgical glove conditioning. Some self-service laundries now offer soap powder packaged in the soluble plastic.

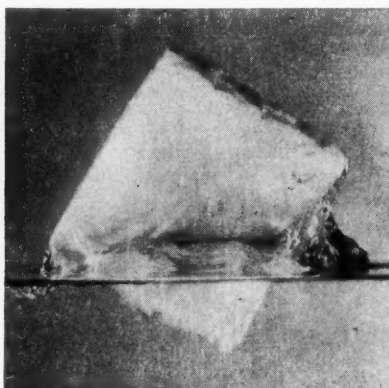
PVA films may obviously contain dry materials and liquids which do not contain "free" water. Besides soaps, detergents, pesticides, and the like, other substances are being eyed for packaging—notably dye, paint, and fertilizer.

PVA, once dissolved, acts as a suspension agent. For example, laboratory tests showed that the dissolved plastic increases dirt suspension by about 60 per cent in *Toss*-washed laundry loads. It is expected that this ability to suspend will have an advantage for the pesticide trade.

According to manufacturers, the film will hold up indefinitely in a relative humidity of 94.2 per cent. A sealed outer package of polyethylene or other standard wrapping film will probably be used where dampness or high humidities are likely to be encountered. ▲



This might well be a spray rig operator "dumping in" his chemicals. PVA-packaged pesticides may be on the market next spring.



PVA-packet of chemical begins to dissolve within seconds after it is dropped into water. Within 45 seconds, it has dissolved completely in water.





WORKING With Wildlife

Conservationists and Dow work together, using herbicides in wildlife management. The author feels "the only limitations on the usefulness of these products lies in the limitations of our own creative imagination."

By J. W. BRITTON*

A LOT IS being said these days about the relationship of pesticides and wildlife—as well it might be. The problem is a real one and deserves the best attention our minds can give it. But for an industry based on solving problems, we have yet to do a commendable job on this one.

The most unfortunate aspect of the whole matter is the common impression that there is necessarily a basic conflict between the use of pesticide chemicals in agriculture or industry with the best interests of wildlife conservation. Perhaps we need to take another look at ourselves. Doubtless we, as individuals, are all in a business related to agriculture because of a basic interest in the out-of-doors and in all living things. Possibly we need to remind ourselves that our products work to control detrimental species of life for the benefit of desirable ones. Certainly deer, waterfowl, fish and song birds number among the desirable species. How then can we admit to any basic conflict of interests?

At Dow, we are proud of the fact we now have some seven years experience in working with wildlife conservationists using weed and brush control products

in wildlife management. We have enjoyed a delightful relationship with many highly qualified scientists in that field, and most important, our work has been fruitful.

We have found that herbicide chemicals have the potential to do quite a number of jobs for the wildlife manager. For example, forest clearings are important to many game birds and animals. These clearings are sunning and dusting areas and increase the amount of "forest edge" where a variety of tall, medium and low plants are available as food and cover. In dense forest stands, these clearings can be opened up with herbicide sprays, or a clearing left by a deserted farmstead can be held with brush control chemicals. Varying the rate of application, timing of the sprays, or the number of applications offers a wide range of selectability in types of plants removed or those that are left.

Woody plants such as aspen, birch, cherry, maple and cedar are an important part of the deer's diet. Lumbering ensures a continual regrowth of young plants as food, but much of our game range is covered with unmerchantable stands. In these cases it has been shown that spraying the topgrowth with a relatively light dose of 2, 4, 5-T causes prolific sprouting from the lateral roots. In one test area the carrying capacity of a parcel of land was raised from 25 to 67

*Manager, Agricultural Chemicals Department, The Dow Chemical Company

LEFT: This opening was created and is being maintained with applications of 2,4-D. The clearing provides needed variety in plant species in a dense forest stand.

deer per section in a single year with this type of treatment.

A critical shortage of suitable marshes for waterfowl is developing in the United States. Many have been drained for farm or industrial use. Of those left, many have been rendered useless by cattails and reeds crowding in to choke out valuable food plants and cover open water. We have shown that with Radapon, our grass control product, we can push back these invading plants and open up the marsh for ducks and geese.

CLEARING PLANTING SITES

Chemical tillage is still impractical for the farmer who must work toward high yields to meet operating costs. However the game manager is interested in developing food patches with a reasonable yield to be left for harvest by game birds and animals. In this case, clearing the planting site chemically is a highly practical and economical method. The method is especially suited to hilly, rocky or boggy land where equipment cannot be used.

There are many others. Aquatic weed control is a promising field of science just getting well started. You are all familiar with chemical control of the sea lamprey in the Great Lakes. And such simple things as using weed control chemicals to maintain fire lanes and access roads can be a great help to game managers, fire fighters and in increasing hunter penetration for a better harvest of game. Doubtless the only limitations on the usefulness of our products in wildlife management lies in the limitations of our own creative imagination.

Today there is an ever increasing demand for outdoor recreation as the American people have more time and more money for travel and outdoor fun. Urban, industrial and agricultural expansion have taken great chunks of the land available. This has left the game manager with the job of providing more game, more fish and more fun from the acres remaining. The agricultural chemical industry has been helping the farmer in just these circumstances for years.

As we consider pesticide chemicals as a tool of the

wildlife manager we realize the need for more and more research—but let us approach this question intelligently. In our research-oriented industry we always see a need for further research. Surely we need to know more about relationships between pesticides and wildlife, but this should never suggest that nothing has been done, because a great deal has been done.

All of our products must be proved safe before we are interested in selling them. In addition, federal and state laws place the burden of proof of safety squarely on our shoulders. As a result, our files are full of data on the toxicity of our products, we have developed analytical methods and have traced the immediate and the long run effects of applications of our products.

This is the very data that wildlife conservationists are calling for. However, our data is still in terms of laboratory or farm animals. It has never been translated into terms of wild species. We must find more and better ways of sharing this information with the wildlife people. Only then can we realistically talk about finding further areas where research can be useful.

SAFETY MARGINS ESTABLISHED

Of course any chemical used in wildlife conservation must have a substantial safety margin to game species. Our industry has stressed safety programs for years—safety to those using the chemical, to domestic animals, desirable plants and to children and pets. I see no reason why comparable emphasis on safety to wild species would not assure the harmonious use of these materials.

Certainly we had to establish the margins of safety before we could conduct the work I have already described. We were able to do this from research data already on hand.

In short, we feel that it has been most rewarding to work closely with the wildlife conservationists. We feel it is a part of the stewardship that any reputable manufacturer maintains over his products. We have found that we have much in common with those who work to maintain our natural heritage. Finally, The Dow Chemical Company takes a large measure of what we hope is pardonable pride in demonstrating that we do have the ability to tackle and solve this sort of specialized problem safely, effectively and economically. ▲

Necessary research in perfecting any pesticide product yields much of the data needed for understanding relationships of pesticide chemicals and wildlife. This family of laboratory mice is undergoing a progeny test after continuous exposure to chemicals in Dow's Biochemical Research Laboratory.

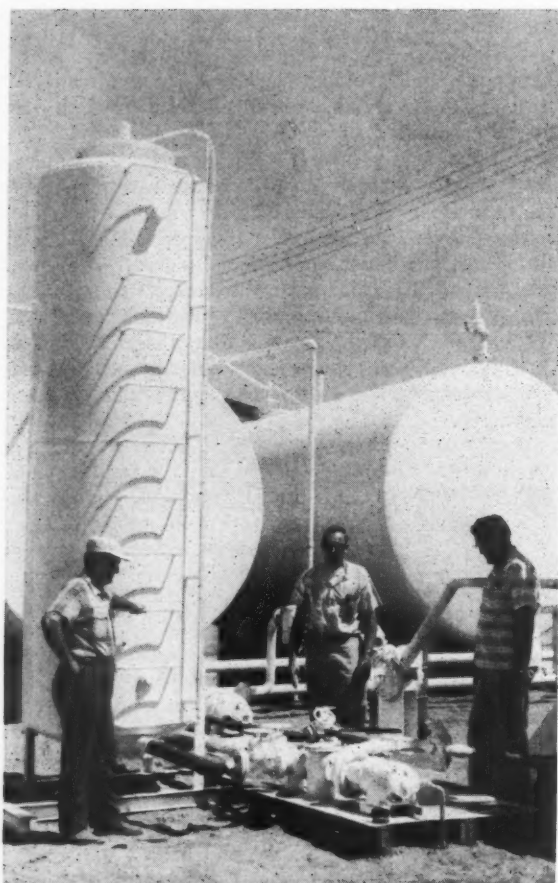


MATERIALS HANDLING CUSTOM APPLICATION

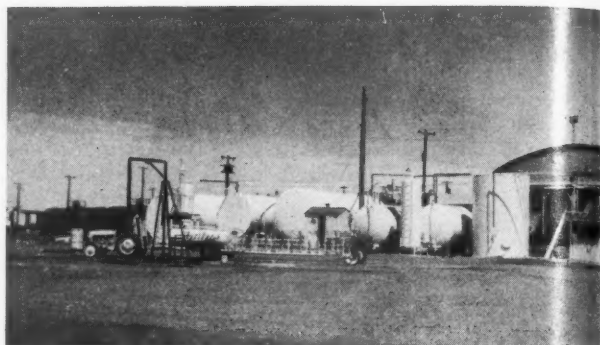
Agriform of Washington, largest liquid operator in the state, helps its customers to get the most for their money. As Bob Mitchell, fieldman, puts it,

**"We'll do
anything
but
pay for it"**

By HOMER HATHAWAY



Bob Mitchell, Harold Swanson and Lyle Neff examine one of the ammonia converter machines, calibrated for measurement.



Ammonia converter and storage facilities.

WHEN WE started operation in 1952 we had one machine for putting out liquid fertilizer. Later in the fall we managed to get two more into operation. Our first equipment was pretty crude by today's standards. It was difficult to move, it pulled hard, and we had to do plenty of 'rigging up' before we could give any kind of service to a customer."

Lyle Neff, president and general manager of Agriform of Washington, Pasco, Washington, was giving a short rundown on the somewhat adverse beginnings of a company which now is, without doubt, the largest liquid operator in the state.

Reasons for that sensational growth were adequately expressed by another member of the company—Bob Mitchell, fieldman—when he said:

"We'll do anything but pay for it!"

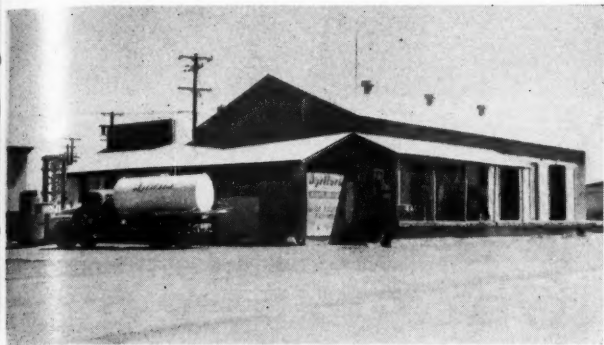
And by "anything," Agriform means just that. They have not only gone down the road made by others who preceded them, but they have branched out on some rough trails on their own, and ended up with a custom-mixed liquid operation that runs as smooth as a well-jeweled watch.

FARMERS WELCOME LIQUIDS

The area served by Agriform, Benton and Franklin counties, is a part of the Columbia River Basin project, and up until 1956 all of their fertilizer business was done with dry land wheat. Liquid fertilizer proved to be an especially welcome tool for farmers in the region, and with the coming of irrigation they have not only held onto these dry-land accounts (there is still much of the area not under irrigation), but they have also added such crops as corn, milo, sugar beets, beans, potatoes, mint and asparagus, as well as pasture and other green crops. And with every crop added to this growing list, they have had to pioneer new methods and new formulas.

When row crops began to be a source of income they found themselves faced with a large market, but no physical equipment specifically designed to fill the bill. So, they invented it themselves. This particular applicator is designed to fit on the rear of a tractor, consists of a 110-gallon tank, using a power take-off pump. As shown in accompanying photos, it can be used as is, or a boom can be attached to it and it can be used as a sprayer. The set-up uses a 3-point hitch, enabling the farmer to put it on and take it off speedily.

FARM CHEMICALS



Main Agriform building, showing one of the company's tank trucks.

This tank, when first introduced, was rented to customers, but now the tanks are being sold to farmers who have found them the most economical and most efficient way to fertilize their row crops.

"LEG TANKS" ARE AVAILABLE

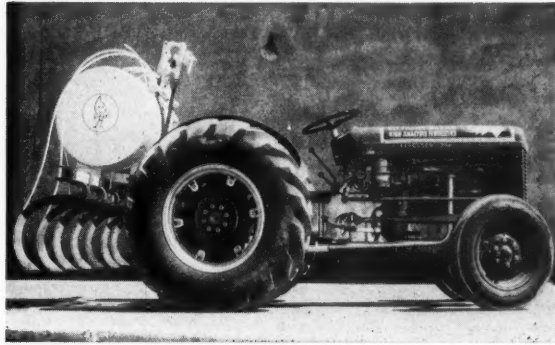
Helping their customers to get the most for their money is a cornerstone of Agriform's success. For the farmer who doesn't want to invest heavily in his own equipment, they have "leg tanks" for use. These tanks, supported on stilts about six feet high, can be transported to a field two at a time, one on each side of a lift truck, and can be set at intervals in the field, so that the farmer drives the shortest distance possible to refill his applicator.

Since Agriform was mainly responsible for bringing aqua into the area, they have remained pioneers in the field ever since. Through their association with Cominco, they were able to introduce 8-24 into the Pacific Northwest. This green phosphoric acid formula was supposed to be impossible to produce, but Agriform kept insisting that nothing was impossible, and their customers *needed* this kind of a formula to get better results, especially from dry land farming. They kept insisting until they got what they wanted.

The ammonia converter shown in accompanying photos is now owned by Cominco—although it was originally built and owned by Agriform, who ships the Cominco product throughout Idaho, Washington and Oregon. All of the Agriform measuring machines are not calibrated for quick and accurate measurement on all orders.

Among the other ways in which Agriform has pioneered in the farm chemical field has been in the writing of a manual on application so that they know exactly how much has to be used in a certain area on each acre of each crop. They also developed a test-bottle for dry-land wheat so that they could easily determine how many pounds of nitrogen would be needed per acre.

The importance of the right amount of the right fertilizer on each crop has always been a specialty with Agriform. Through a local independent laboratory, they are able to give a farmer a soil test report "the day before he asked for it." Perhaps not that quick, but the idea is that when a farmer comes in and asks



This is the machine Agriform invented for row crop work.

for a report, he usually wants it "yesterday." He has a complete and factual report the day following. Agriform takes the actual sample and does all the field work, and Tuttle Laboratory does the rest. Actually, in some areas, when a farmer requests fertilizer application, Agriform will not even attempt to serve him UNLESS a soil sample and test is run first. They have a reputation to protect, and this is just one of the ways in which they keep that reputation intact.

Another way in which they serve customers in the area, especially those in a hurry and who don't feel they want to wait for a rig to come out to them from the main yard at the Pasco airport, is provided by Agriform "filling stations" scattered throughout their customer area. These filling stations are located at farm homes in the area, a large tank from which the customer can fill his rig.

A MONEY AND WORK SAVER

"During the rush season, a farmer can drive just so far and haul his rig just so far, especially if he is using a large outfit. These dispensing stations have proven the answer for faster service and again, it saves a customer money, and it saves us a lot of work, also," said Harold Swanson, office manager and operations head. "The set-up consists of a large tank and a pump, and we have five of them in operation year-round."

What kind of a future is there for pesticides in the area?

"Pesticides are definitely on the increase here," said Swanson. "We are putting out more fertilizer and pesticide combinations all the time. At the present time we are selling more aldrin than anything else, mainly for wireworm control in potatoes."

"If you tell a customer that he stands to lose 20 or even 30% of his crop to insects, he is likely to shrug it off as part of the risk," chimed in Bob Mitchell, "but when he realizes that he stands a good chance of losing ALL his crop, or having it classified by the buyer as inferior, then it's no longer 'a part of the risk.'"

In this desert area, which goes to extremes of soil and weather conditions, Agriform has developed, through pioneering and money-saving devices, one of the outstanding custom-mixing and applicator operations of the entire state. The growth of their physical properties and sales proves that their approach to farm chemicals selling is the right one for them. ▲

3 *problems in aerial application of pesticides:* LIABILITY LEGISLATION INSURANCE

By HENRY C. MOORE*

I will first try to qualify myself by saying that I have been an agricultural pilot since 1942, and what is commonly referred to as an "operator" since 1945.

During the past 15 years, since we started our operation in Tulare county, the number of agricultural aircraft working within, and permanently based within, this one county has grown from 6 to 50. The agricultural aircraft fleet throughout the entire state has risen from about 100 to 1000 with five to six hundred in the air at the same time during busy seasons.

This is as fine a fleet of agricultural aircraft as any in the world. They are well maintained, flown by competent, responsible pilots (who incidentally have been licensed by both the federal and state governments), and managed by reasonably smart operators (also licensed by the state of California and found to be qualified in each county in which they operate).

In operating an agricultural aviation business we have many advantages not enjoyed by the country as a whole. These advantages also accrue to your farm chemicals industry.

Our long-growing seasons, irrigation, adequate financing of crops, and orderly marketing give us all tremendous advantages over our counterparts in some other parts of the United States where short summers, dependence on rainfall and related problems cause erratic conditions in both the aerial application industry and the agricultural chemical business.

Having been asked to discuss the subject of "Air Application of Pesticides", I find myself at a loss.

Most of you are fully aware that we dispense dry pesticides in the form of dusts, granules, pellets and so on, including seeds and dry fertilizers through some form of venturi or spreader. Also, that we spray—using varying amounts of solvents, spreaders, liquid fertilizers, trace minerals, insecticides, defoliants, and herbicides in all sorts of combinations, mixed with water or oil or both.

The equipment used to make these applications varies somewhat in design as do the make and model of the aircraft in use. However, competition is keen, and you can be sure that all equipment is satisfactory or the operator would have been out of business long ago. Since you people are all aware of the foregoing conditions, I will confine myself to three "Problems Concerning Air Application of Pesticides".

THREE PROBLEMS concerning air application of pesticides are: Liability—Legislation—and Insurance. They are important to your industry as well as ours, for unless we can solve them on a continuing basis we will eventually be unable to apply your products.

On the subject of Liability—Legislation—and Insurance, bear in mind that I am not a lawyer, legislator, nor an insurance man. I am speaking as one who may become liable, one who is forced to operate within legislation, and as a buyer of insurance.

Liability is a thing we must all assume some of. Legislation sometimes determines liability or limits your operation so that you cannot do some of the things you have been doing that subjected you to potential liability. Insurance is what you buy to keep from going broke if you should be adjudged liable.

Now, when we take off with an agricultural aircraft, we generally have on board a quantity of some kind of economic poison.

Our ordinary liability consists of damage we might do to the property of any third party with the airplane itself, such as contacting telephone or power lines, hitting a vehicle, implement, animal or person. Or we may frighten turkeys, chickens or livestock with excessive noise.

We can and do overcome most of this potential property damage and liability by making our turns away from dairy barns, staying away from turkey ranches, making prior inspection of jobs to be done, and most important, proper planning on the part of the pilot. Because we are able to hold this type of accident to a satisfactory minimum, our industry is able to buy adequate ordinary property damage and public liability insurance at reasonable rates.

DRIFTING PRODUCTS

The real problem from the standpoint of property damage and public liability is concerned with *drifting products*. We also buy a policy of insurance called "Drifting Products" liability. Since the passage of the Miller Law, the rates for this class of insurance have doubled, and in addition, the "grower liability"

(Continued on page 47)

* Past President, Agricultural Aircraft Association, Inc. Presented at the "New Pesticides Review for Central California," Fresno Fair Grounds, September 10, 1959.

READER SERVICE

*FREE INFORMATION to help you
solve fertilizer, pesticide problems*

Chemicals

294—REVISED CHEMICAL PRODUCTS LISTS

A newly revised products list of "Hooker Chemicals" has been published by Hooker Chemical Corp. The bulletin contains brief descriptions, physical data, uses and shipping information for the many chemicals listed. Those manufactured by Hooker's Phosphorus Div. are listed separately and described in a two-page supplement which is also available. To obtain your copy of the 12-page products list and supplement, just

CIRCLE 294 ON SERVICE CARD

295—INSECTICIDE BAITS

Tests with fruit flies and other insects have proven that P.I.B. (protein insecticide baits) give sprays better and surer kill efficiency at lower cost, according to A. E. Staley Mfg. Co. The maker says that attractant properties hold for two to three weeks. Full details are available, by

CIRCLING 295 ON SERVICE CARD

296—CHLOROPHEN

"Chlorophen 663 and 664" is the title of a new technical bulletin from Reichhold Chemicals, Inc. The bulletin describes the use of Chlorophen in pre-emergence weed control and for soil poisoning. Specifications, physical properties and solubility data are included, as well as information on the use of 663 and 664 for slime and algae control and other uses. The company will send you a free copy, if you

CIRCLE 296 ON SERVICE CARD

297—"HOW TO" FOLDER ON HARVEST AID

"How to Desiccate Seed Alfalfa with Penco Endothal Harvest Aid" gives application rates for application by airplane or ground rig. The illustrated folder from Pennsalt Chemicals also tells what the product is, how it is used, when to apply and when to combine. For your free copy

CIRCLE 297 ON SERVICE CARD

298—MASKING AGENTS FOR FARM CHEMICALS

P. Robertet & Cie says it offers practical long-lasting masking agents for insecticides and fertilizers. Not only do these new products effectively odor-mask the chemical odors, the manufacturer reports, but they also add their own pleasant fragrance to your products. The company, which has a plant in Stamford, Conn., will send you more information, if you

CIRCLE 298 ON SERVICE CARD

299—TESTING SERVICES

A free schedule of services is available from Scientific Associates. Listed are prices for chemical, biological, and physical tests, and toxicity tests, as well as a

description of special services offered by the firm. They include advertising assistance, certification of products, consultation, and many others. The fourteen-page booklet will be yours, if you

CIRCLE 299 ON SERVICE CARD

300—PESTICIDE FORMULATION

Witco Chemical Co., Inc., is offering pesticide formulators a manual, titled "Pesticide Formulation" which describes Emulsol emulsifiers for the agricultural industry. It's easy to get a free copy—

CIRCLE 300 ON SERVICE CARD

301—NATIONAL STICKER

A bulletin and sample of National Sticker are available from Holloway Corp. The product greatly increases the retention qualities of insecticide water spray mixtures, the bulletin reports. The bulletin describes how the sticker was tested, advantages, and test results on apples, peaches, tomatoes, corn, potatoes, cucumbers, dairy barns and cattle.

CIRCLE 301 ON SERVICE CARD

Process Equipment

302—STRAIGHT-FLOW CONTROL VALVE

General-American Valve Co. says its straight-flow control valve reduces pressure drop and friction loss while giving infinitely variable throttling. This is accomplished, G-A reports, because flow moves in a direct and unrestricted straight line through the valve at all throttling positions. The valve has outside stem and bonnet for corrosion resistance, and the orifice opening is indicated on a calibration plate. Valves are made in carbon steel, stainless steel and bronze. Pressure ratings are from 600 psi to 10,000 psi. Sizes: $\frac{1}{8}$ " to 4". For details,

CIRCLE 302 ON SERVICE CARD

303—NIAGARA METERS

A new catalog of Niagara Industrial Liquid Meters includes additional data to facilitate use of the meters in measurement of 200 liquids. Among those listed are DDT, toxaphene, weed killers, anhy-

drous and aqueous ammonia, ammonium nitrate, ammonium sulfate, ammonium phosphate, nitrogen solutions, phosphoric and sulfuric acids. The catalog includes dimensions, pressure loss data and principles of operation. To get your copy

CIRCLE 303 ON SERVICE CARD

304—DODGE FLEXIBLE CUSHION COUPLINGS

An expanded line of Dodge Para-flex flexible cushion couplings ranging from fractional to 190 hp per 100 rpm is described in a new 12-page bulletin. Two new sizes have been added to the 10 previously offered. New PX24, largest in the line, is capable of delivering up to 2,000 hp at 1080 rpm, Dodge claims. Photographs, drawings and text explain design features and operating characteristics of Para-flex. Detailed tables of hp ratings, prices, dimensions and service factors for many applications are included. For your free copy

CIRCLE 304 ON SERVICE CARD

305—FULL-FLOATING HUM-MER

The Type 72 Hum-mer Electric Screen is equipped with a spring tensioned "full-floating" screening surface, which gives it an extremely effective sorting action, reports The W.S. Tyler Co. It can be used in screening fertilizer, stockyard-by-products, ores and other materials. Supplied in one or two surface units, three and four feet wide in five, six, eight and ten foot lengths, the Hum-mer is equipped with one or more V-16, V-50 or V-52 electric vibrators. For more information,

CIRCLE 305 ON SERVICE CARD

Materials Handling

306—EXIDE INDUSTRIAL TRUCK BATTERIES

A new line of storage batteries said to boost the work capacity of present-day electric industrial trucks by as much as 45 per cent is described in a technical bulletin offered by Exide Industrial Div. Photos, sketches and text detail the design and construction of Exide-Ironclads. There are cutaway views and closeup enlargements. For a copy of the eight page bulletin,

CIRCLE 306 ON SERVICE CARD

307—HYDRAULIC PALLET TRUCK

A circular describing a 2,000 lb. capacity lightweight hydraulic pallet truck has been published by Lewis-Shepard Products, Inc. The four-page, two-color presentation

how to use the READER SERVICE CARD

- Circle number of literature you want
- Print or type your name, position, company and address
- Clip and mail the Service Card

**See pages 57 and 58 for information
on these Reader Service numbers:**

- 321—Union I&C dual head sewing stand
- 322—Challenger lime and fertilizer spreader
- 323—Piper Pawnee for air application of chemicals
- 324—New polyethylene film for industrial bags
- 325—Pelletizing-mixing discs from Dravo

contains illustrations, specifications and operating details on the new HPF pallet truck. Among the features of the truck are 360° operation of tow handle, high location of handle pivot for easy pulling, no grease points and a high pressure hydraulic foot pump. For your copy of the circular

CIRCLE 307 ON SERVICE CARD

308—H-25 PAYLOADER

A "concentrated package of tractor shovel"—that's how The Frank G. Hough Co. describes its H-25 Payloader, with 2,500 lb. carry capacity and six ft. turning radius, power-shift and power-steering. A ten-year Payloader user told the company that the H-25 "is faster, carries larger payloads and we get maximum operator efficiency because of less operator fatigue." Boom and bucket mechanism are reported to be rugged and simple with fewer parts and linkages and with anti-friction bearings at critical pivot points. Literature containing complete information is available without charge. Just

CIRCLE 308 ON SERVICE CARD

309—FLITE-FLO CONVEYORS

Just released by Link-Belt Co. is a four-page publication on Flite-Flo, the company's fully enclosed, self-cleaning flight conveyor. The folder gives dimensions, capacities and other specifications on Flite-Flo units which can handle free flowing, granular, non-abrasive bulk materials in horizontal or limited inclined paths. A copy of the folder can be obtained by

CIRCLING 309 ON SERVICE CARD

**310—PUMP FOR
TRUCK TRANSPORTS**

Waterous Co. says its compact rotary pump with 300-gpm capacity and 70-pound weight is specially suited for fast unloading of truck transports. Designed for over-the-road transports whose cargos range from petroleum to industrial chemicals, the Model HJ700 has three-lobe rotors independently driven by hardened steel pilot gears. In the pump, liquid is continuously displaced ahead of engaging rotors, Waterous reports. Further information is available by

CIRCLING 310 ON SERVICE CARD

Packaging

**311—LABELER FOR
ROUND CONTAINERS**

A fully automatic labeling machine for round containers has been announced by Long and Co. Featuring automatic escapement, pressure roll and large label

reservoir, Model 4-A will apply both spot and wrap around labels onto round containers from 1½ inch to 7 inches in diameter. It will feed, label and eject containers at 36 per minute, Long and Co. claims. For details,

CIRCLE 311 ON SERVICE CARD

**Application
Equipment**

**312—LIQUID FERTILIZER
APPLICATORS**

Pollard mixed liquid fertilizer applicators and liquid nitrogen applicators are illustrated and described in literature from Pollard Manufacturing Co. The manufacturer says its applicators are efficient, rugged and economical. Tank on the mixed liquid fertilizer applicator has 1¼ ton capacity. Other features of the applicator include high clearance frame, adjustable boom height, short turning radius and constantly visible flow, according to Pollard. For copies of the literature,

CIRCLE 312 ON SERVICE CARD

**313—PUMP RUNS OFF
PICKUP TRUCK BATTERY**

After a year's on-the-job testing of more than 300 units, a new model Paddle Pump, direct coupled to an electric motor (6 or 12 volt DC) has been released by the Jerome Simer Co. The 20 gpm noiseless, self-priming, bronze paddle pump is built to fill, empty or transfer liquids like spray solutions, water, gasoline, etc. Simer Co. reports that a variety of accessory items, hoses, nozzles, strainers, etc. are available for adapting the synthetic rubber impeller pumper to individual jobs. To obtain more information

CIRCLE 313 ON SERVICE CARD

**314—FIBERGLASS TANK
FOR CORROSIVES**

A new molded fiber glass tank for use in spraying or storing corrosive liquids is being produced by Molded Fiber Glass Body Co. It is recommended by the manufacturer for use as a spray tank for insecticides and liquid fertilizers, or as a storage tank for chemicals. The tank is easy to clean, lightweight and impact resistant, the firm states. It is 58" long with a 32" diameter. More information is easily obtained. Just

CIRCLE 314 ON SERVICE CARD

315—METERING PUMP

For metering clear and corrosive liquids to chemical processes, Milton Roy Co. offers the dynamic new Model CM chemical metering controlled volume pump.

The Model CM delivers maximum capacities to 28 gph in simplex designs and double that gallonage in duplex designs, Milton Roy reports. It is constructed to handle pressures to 1,100 psi. For literature,

CIRCLE 315 ON SERVICE CARD

Miscellaneous

**316—CHEMICALLY RESISTANT
LABORATORY WARE**

Polyethylene, polypropylene, polyurethane and polyvinyl plastic laboratory apparatus is covered in a new 24-page catalog from General Scientific Equipment Co. More than 100 products are illustrated and described, and technical properties are discussed. The catalog is available without charge. Simply

CIRCLE 316 ON SERVICE CARD

**317—DUST AND FUME
FILTRATION**

A descriptive four-page folder, "The Modern Solution to Fume and Dust Filtration Problems," is available free of charge from Menardi & Co. Among applications for the company's Maco-Glas fabric filter bags covered in the folder are in the fertilizer industry. It states that the bags have been successful in collecting dust from triple superphosphate production. The folder will be mailed to you, if you

CIRCLE 317 ON SERVICE CARD

318—METERING VALVE

Development of a new metering valve, featuring 40-pitch thread and extraordinary needlepoint flow control in the 0 to 4000 cm/min air flow range, is announced by Nuclear Products Co. Service in research lab sampling systems, spectrographic and chromatographic work are reported to be just a few of the valve's many functions. Each valve has a stainless steel 316 stem for strength and maximum corrosion resistance. For details,

CIRCLE 318 ON SERVICE CARD

319—SPECTROPHOTOMETERS

Performance and versatility features of the Beckman DK Double-Beam Ratio Recording Spectrophotometers are illustrated in a new brochure published by Beckman Instruments, Inc. The 12-page brochure also lists specifications, application data and accessories for the DK-1 and DK-2 spectrophotometers. For copies,

CIRCLE 319 ON SERVICE CARD

320—FEND CREAMS

Three new creams that provide protection against skin irritants encountered in industry have been developed by Mine Safety Appliances Co. MSA recommends Fend A-2 against water insoluble irritants; Fend I-2 against water soluble irritants such as ammonium nitrate solutions, nitric, phosphoric and sulfuric acids; and Fend S-2 against soluble and insoluble irritants, including fungicides and urea formaldehyde. A bulletin contains more information on the creams. It's yours, by

CIRCLING 320 ON SERVICE CARD

FARM CHEMICALS

MATERIALS HANDLING CUSTOM APPLICATION

LIABILITY, LEGISLATION and INSURANCE

(Continued from page 44)

endorsement has been raised from 15% to 50% additional premium. (I might mention that grower liability is an addition to the policy which most operators buy to make sure their customers are properly protected in the event of a claim.)

Also, an exclusion has been written into all these policies making coverage void if the claim concerns any of the chemicals given a zero tolerance by the Miller law. As an example, DDT drift on alfalfa. In the past 60 days there have been offers from some insurance companies to remove this exclusion for an additional 25% premium and with one thousand dollars deductible in the event of a claim. While we feel that the insurance companies are guilty of gouging us on this coverage, there remains the fact that there are in Sacramento awaiting disposition several cases of agricultural chemical drift onto adjacent crops that took place during the season just past.

A DIVERSIFIED AGRICULTURE

In most parts of California our agriculture is highly diversified, making it almost impossible to keep pesticides intended for one crop off others—this is especially true with dust formulations.

While keeping statistics to a minimum, I would like to point out that while the largest city in Tulare county has a population of only 15,000, the rural population numbers almost 100,000 people—each one a potential liability claim.

As most of you know, there are many areas where there is an average of one house to each 40 acres. In other words, when working an agricultural aircraft, you are very fortunate if you are over $\frac{1}{4}$ mile from a house, dairy barn, pasture, or susceptible crop. These conditions will not improve, but will become progressively worse as the population increases and people decide on suburban living.

So far we have not considered legislation. Each session of the State legislature, we see new bills aimed at putting us out of business or seriously curtailing our activities. In future years we expect to be accused of

causing smog (a San Joaquin Valley Smog Control District is in the offing, and I read as long as 5 years ago in the public press that part of our valley smog was caused by agricultural dusting). I know of an eye, ear, nose, and throat specialist who blames all the trouble he can't account for on pesticides.

HOW INDUSTRY CAN HELP

The agricultural aircraft industry must have good public relations. One way to accomplish this is to hold damage claims (both real and imaginary) to the absolute minimum. In helping us to do so, you also benefit your industry, as we distribute large tonnages of your products.

In closing I will finally come to the point. In selling a job, put yourself in our position. How can we get it on without undue risk of damage or claim of damage from the neighbors?

Acquaint yourself with the rules and regulations—both state and county—under which we are operating our aircraft.

Read the Miller Law—or better yet—read interpretations of it.

In the last few years, many dust applications have been converted to spray, with results at least as good. Don't fight this trend. Encourage it. As required by state regulation, a pilot can substantially confine spray, pellets, or granular materials to the field being treated. You all know that this is impossible with dust.

Finally, if you want to give instructions to the pilot concerning the application of a job—fine! However, give them some thought. One insecticide order this summer was delivered with the following instructions: "Use a heavy airplane and fly fast".

I have not intended to brow-beat you fellows—only to acquaint you with some of our problems as aerial applicators. As the population and rural congestion in California grows, we must solve these problems if our industry is to survive. You can help us do this. Thank you. ▲



PATENT REVIEWS

By Dr. Melvin Nord

AQUA AMMONIA PRODUCTION

U. S. 2,890,937 issued June 6, 1959 to Dick P. Bresee and assigned to Phillips Petroleum Co., describes a process and apparatus for the production of aqua ammonia from anhydrous ammonia and water, for use as a liquid fertilizer.

The process and apparatus are illustrated in Fig. 1.

To start the unit up, the cooling water pump 19 is started and water is sprayed over the tank 10 through spray rings 36. The total amount of water to be employed in making the batch of aqua ammonia is introduced into the tank through line 40. Valves 5, 8, 9 and 12 are opened; valves 7, 13, 15, 16, 18 and 21 being closed. The pump 26 is then started. All of the air in the converter is then vented through line 31 and valve 5, after which valve 5 is closed. Anhydrous ammonia is then admitted by opening needle valve 15 wide enough to admit a slow stream of anhydrous ammonia into the converter. Preferably, this rate is slow enough so that the material at the outlet of the converter is below its boiling point. Since the water flowing in line 24 contains more and more ammonia as time progresses, needle valve 15 is adjusted as necessary to assure that the solution leaving the converter is below its boiling point. The hot aqueous ammonia flowing through lines 32, 35 and then to spray means 17 is sprayed against the walls of tank 10 and runs down

the side of the tank in indirect heat exchange relationship with the cooled film of water flowing on the outside of the tank and is thus cooled before flowing into the body of liquid in the bottom of the tank. Because the aqueous ammonia from the converter is hotter than the material in the bottom of the tank, much better heat transfer is obtained than if the material from the bottom of the tank were circulated through the sprays, due to the greater difference in temperature differential. However, after the body of liquid in tank 10 has become fairly concentrated in ammonia, the flow of hot aqueous ammonia from the converter is switched from the sprays to the bottom of the tank. This is done, because if the hot aqueous ammonia was continued to be sprayed into the top of the tank near the end of the conversion, the concentration of the material leaving the converter would greatly exceed the average concentration of the tank contents and would also have a much higher temperature. In the last part of the cycle, circulation for heat exchange through spray means 17 is obtained by pumping liquid from the bottom of the tank up through the sprays.

DICALCIUM PHOSPHATE

U. S. 2,889,200, issued June 2, 1959 to Ira M. LeBaron, assigned to International Minerals & Chemical Corp., describes a method of

preparing substantially fluorine-free dicalcium phosphate.

Florida phosphate rock, is reacted with 53° Bé sulfuric acid in a ratio of 10 tons of rock to 6 tons of acid. The mixture is aged. The soluble constituents are then leached out with an aqueous medium, producing a leached solution of 32° Bé gravity. The slurry is filtered to recover a solids-free filtrate. The filtrate is then diluted to 14% P_2O_5 concentration, and is treated with 4.7 parts of calcium carbonate per 15 parts of P_2O_5 , producing a pH of 2.3-3.0. This mixture is reacted for 30 minutes. The resulting slurry is filtered, producing a filtrate of defluorinated liquor containing substantially all the P_2O_5 values.

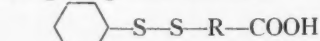
The defluorinated liquor is treated with additional calcium carbonate in a 1 to 1 ratio of P_2O_5 to calcium carbonate. The solids formed are filtered, to recover the dicalcium phosphate precipitated solid material. The solids are dried at 250°F. to produce a product analyzing 20% elemental phosphorus.

U. S. 2,889,217 (same date, same inventor, and same assignee) also relates to this subject.

U. S. 2,890,934, issued June 16, 1959 to Roger Bart, assigned to International Minerals & Chemical Corp., describes a method of continuously precipitating dicalcium phosphate from acidic phosphorus-bearing solutions containing iron in solution as an impurity. The process consists essentially of reacting the solution in a succession of stages with calcium carbonate.

HERBICIDES

U. S. 2,884,317, issued April 28, 1959 to John F. Harris, Jr., assigned to E. I. du Pont de Nemours & Co., discloses the herbicidal activity of certain anyl carboxyalkyl disulfides having the general formula



Where X is hydrogen, halogen, or alkyl up to C 4, n is 1-3, and R is alkylene up to C 7.

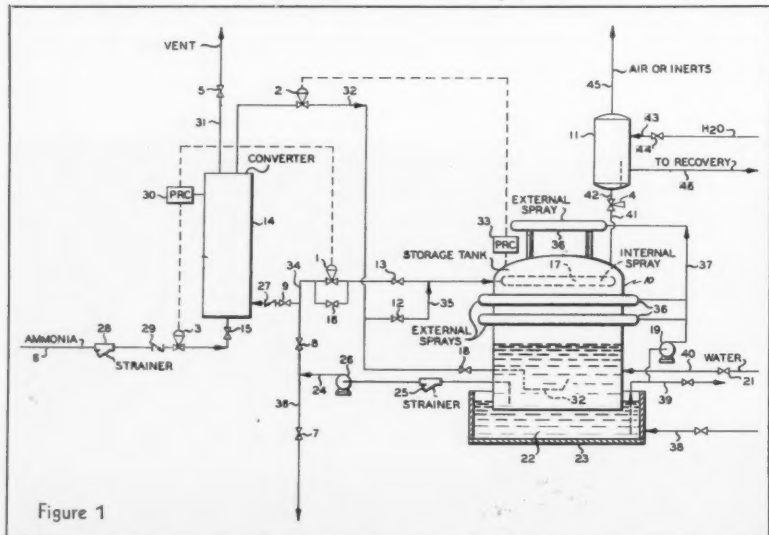


Figure 1

U. S. 2,885,278, issued May 5, 1959 to Karl Brack, assigned to Hercules Powder Co., discloses herbicidal compositions containing esters of 1-ethynylcyclohexanol.

U. S. 2,887,371, issued May 19, 1959 to George E. Bennett and William W. Lee, assigned to Monsanto Chemical Co., discloses the use of silyl acetylenes as herbicides.

U. S. 2,887,372, issued May 19, 1959 to Harry Tilles and Joe Antognini, assigned to Stauffer Chemical Co., discloses the use of lower alkyl esters of N-furfurylthiolcarbamic acid as herbicides.

METHOD FOR MAKING PHOSPHORIC ACID

U. S. 2,890,936, issued June 16, 1959 to Curt S. Benefield, describes a method and apparatus for the digestion of ground phosphate rock with 75-95% sulfuric acid for phosphoric acid production.

The apparatus is shown in Fig. 2. The process is carried out by filling the digesters 1 and 2, along with any other digesters in the series, to a level well above the tops of the cooling coils with a slurry of ground phosphate rock in water or dilute aqueous phosphoric acid such as a mixture of product acid from the process and wash water from the calcium sulfate filters. This slurry is usually prepared by wetting out the ground rock in a mixing tank, in pebble mills or other suitable mixing equipment and the slurry may be preheated to digestion temperatures if desired. Sulfuric acid is introduced into the headers 25 and 26 and flows downwardly through the probes A-E. After the desired digestion temperatures are attained which are usually within the range of about 140°-195° F., water is passed through inlet pipes 9 into the coils 6 and 7 and serves to remove the excess heat of digestion. The digestion process then proceeds with continuous introduction of additional quantities of phosphate rock slurry and sulfuric acid, preferably at rates such that 1% to 4% of free sulfuric acid is maintained in the digesters. Substantially complete digestion with extractions of 96-97.5% of the P₂O₅ content of

the rock have been obtained in commercial practice in as little as 1 hour digestion time with uniform distribution of the incoming sulfuric acid, whereas with addition of all of the sulfuric acid in a single stream, which is the usual practice, extractions of only about 90-92.5% of the P₂O₅ required 1 hour and 52 minutes.

After the process is operated for a time a coating of gypsum begins to form on the outer walls of the cooling coils 6 and 7. When this coating becomes so thick as to interfere with effective heat exchange the flow of cooling fluid is

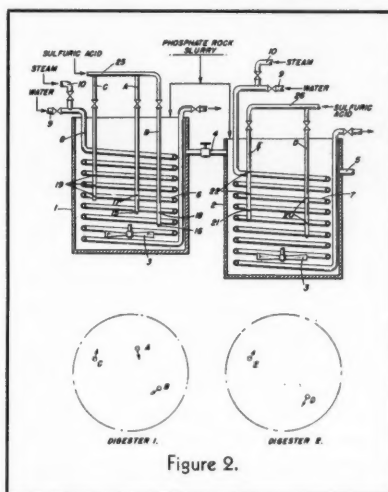


Figure 2.

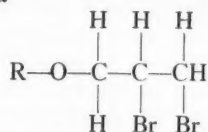
shut off and steam under about 40 lbs pressure or greater is admitted to the coil through line 10. This results in heating the coils and cracking off the scale promptly and cleanly without interrupting the digestion process. By so substituting a flow of steam in the coils the scale can be cracked off at any time that the process requires, after which the flow of cooling water through the coils is resumed and the digestion process is continued without loss of time and without resorting to a period of digestion at reduced rates.

PESTICIDES

U. S. 2,889,244, issued June 2, 1959 to Charles R. Youngson and assigned to the Dow Chemical Co., describes a method of treating nematode infested soil to control soil-dwelling organisms and to improve its plant growing properties.

The method consists of introducing into the soil a nematocidal con-

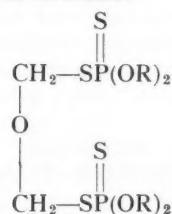
centration of an active agent which is an ether compound having the formula



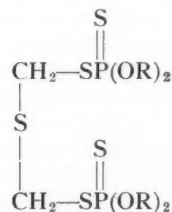
Where R is alkyl, allyl, or propargyl.

U. S. 2,889,245, issued June 2, 1959 to Wilhelm Bonrath and Ewald Urbschat, assigned to Farbenfabriken Bayer Aktiengesellschaft describes a process of controlling fungi infestation of seed grain, utilizing as the fungicide a hydroxyl aromatic diazo derivative.

U. S. 2,884,353 and **2,884,354** issued April 28, 1959 to Donald L. Christman, assigned to Hercules Powder Co., discloses certain organic dithiophosphates which are useful as insecticides (e.g. killing pea aphids, southern army worms, and Mexican bean beetles). The products have either of the following general formulae:



or



Where R is a lower alkyl radical.

U. S. 2,885,416, issued May 5, 1959 to Dino Costabello, Lido Porri, and Gioacchino Boffa, assigned to Montecatini—Societa Generale per l'Industria Mineraria e Chimica, describes a process of preparing a fungicide based on zinc ethylenedithiocarbamate.

U. S. 2,887,433, issued May 19, 1959 to George Swank, Jr., assigned to the Upjohn Co., discloses a fungicidal composition containing cycloheximide and pentachloronitrobenzene.

(Continued on page 59)

NEWS OF THE INDUSTRY

V-C CONTRACTS FOR SULFURIC ACID FACILITIES

Contract for engineering and construction of a contact sulfuric acid plant at Nichols, Fla., for Virginia-Carolina Chemical Corp. has been awarded Leonard Construction Co. of Chicago.

The plant, which will use elemental sulfur as a raw material, will have a rated daily capacity of 500 tons. The acid will be used for additional production of phosphate rock, phosphoric acid and fertilizers.

Completion is scheduled for June, 1960, Leonard said.

HY-TROUS CO. ACQUIRED

Fisons Ltd., of England, and Albatros Superfosfaatfabrieken, N.V., of Holland, are reported to have acquired Hy-Trous Co. of Canada. A new company, Hy-Trous Co. of Canada 1959 Ltd. has been formed with A. Lambert as president.

Modernization and expansion, including the addition of granulating equipment, is now underway at the Cornwall, Ont., plant.

RIS-VAN, INC. BUILDS LIQUID FERTILIZER PLANT

Kenneth VanDuzer, president, has announced that Ris-Van Inc. plans to have its new liquid fertilizer plant at Sanborn, Iowa, in production by October 15.

The plant, reported to have a capacity of 1,000 tons per day, will serve retail outlets in northwest Iowa, southwest Minnesota, Nebraska and South Dakota.

DU PONT MAKES CHANGES IN AG SALES ORGANIZATION

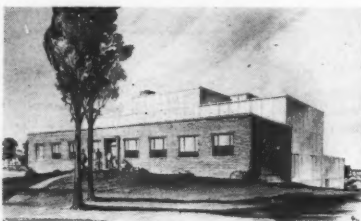
Sales of Du Pont agricultural and industrial products made by the company's Industrial and Biochemicals Department will be consolidated under two new groups to strengthen marketing efforts and provide better service to customers, the company has announced.

The Industrial Chemicals Div. will be responsible for the sale of all industrial chemicals formerly handled by the Grasselli Chemicals and Polychemicals Departments. The Biochemicals Div. will be re-

sponsible for all agricultural products formerly handled by these departments as well as sales of anti-freezes.

Thomas H. McCormack, formerly director of sales for Grasselli products, has been appointed general director of sales for the department. W. James Latimore, former assistant director of sales for biochemicals, was named director of sales for the Biochemicals Div.

SPENCER CHEMICAL TO ADD A RESEARCH BUILDING



Spencer Chemical Co. has announced plans for the construction of a new building at its Research Center to house its Process Development Department.

To be located southwest of the main administrative-laboratory building at the Center, the structure will have about 11,000 square feet of floor space for process development activities and offices. The building will have a brick front, with sides and back of insulated cement-asbestos panels on a steel framework. Completion is scheduled for early 1960.

SMITH-DOUGLASS GRANTS HAVE HELPED 209 STUDENTS

Smith-Douglass Co. reports that in five years, its college scholarship program has helped 209 students. Most grants have been for \$1,000.

Commenting on the program, Ralph B. Douglass, chairman of the board, said, "As more young men leave our farms for other types of employment and activity, it becomes increasingly important to train those who choose to farm how to be successful. That is the aim of our scholarship program."

Douglass pointed out that the company has little to do with the scholarships, other than supply the funds. FFA, 4-H or college officials select the recipients and review their progress periodically.

AGR. POTASH DELIVERIES INCREASE 17 PER CENT

Deliveries of potash for agricultural purposes in the United States, Canada, Cuba, Puerto Rico and Hawaii by eight American potash producers and importers totaled 3,968,323 tons of salts containing an equivalent of 2,325,485 tons K_2O during the fertilizer year July 1958 through June 1959, according to the American Potash Institute. This was an increase of 17 per cent in salts and K_2O over the preceding fertilizer year.

Continental United States took 2,166,458 tons K_2O , compared with 1,838,292 tons K_2O the preceding year; Canada, 98,857 tons, compared with 86,516 tons in 1957-58; Puerto Rico, 22,218 tons, compared with 18,708 tons; and Hawaii, 23,270 tons, against 20,756 tons the previous year.

Total deliveries for all purposes were 4,591,601 tons of salts containing an equivalent of 2,703,162 tons K_2O , an increase of 18 per cent in salts and K_2O over the last year.

Illinois, with 233,434 tons K_2O was the leading state for deliveries, followed in order by Indiana, Ohio, Georgia, Florida and Virginia. American Potash Institute noted that deliveries do not necessarily correspond to consumption in a given state.

Muriate of potash was the principal grade, comprising over 93 per cent of the total agricultural potash delivered, while sulfate of potash and sulfate of potash-magnesia together made up over 6 per cent of deliveries.

SUMMERS ACQUIRES CHEMGRO, INCORPORATED

Acquisition of Chemgro, Inc., Fergus Falls, Minn., has been announced by James E. Totman, president of Summers Fertilizer Co., Inc. The purchase involved the plant, equipment, inventory and trade mark. The operation, which will be under the direction of W. A. Stolt, Summers' general manager of operations in the Dakotas, will be designated as Chemgro Division of Summers. Present management of Chemgro will become affiliated with Summers as co-managers of the local operation.

IMC BUYS BARTLESVILLE PLANT FOOD PLANT

International Minerals & Chemical Corporation's Plant Food Div. has purchased a fertilizer plant in Bartlesville, Okla.

Formerly operated by Moneka Farm Stores, Inc., the plant has been inactive during the past year. After modernization and adding new equipment, the plant will specialize in production of Rain-bow, IMC's premium plant food.

DOW REPORTS ON SALES & EARNINGS.

The Dow Chemical Co. has reported sales of \$705,442,403 and earnings after taxes of \$62,916,016 for the fiscal year ended May 31. Sales for the previous fiscal year totaled \$636,201,143 and earnings after taxes were \$46,059,181.

Chemicals accounted for 51 per cent of Dow's sales, plastics 35, magnesium 8 and agricultural chemicals 6 per cent.

NEW NITRIC ACID PLANT FOR FLA. NITROGEN CO.

Florida Nitrogen Co. has awarded a contract for design and erection of a nitric acid plant to The D. M. Weatherly Company of Atlanta, Ga. Construction is underway on the plant, located in Tampa, Fla.

STAUFFER TO INCREASE THIOL CAPACITY 50 PER CENT

Stauffer Chemical Co. plans to construct a new thiol (p-chloro-thiophenol) plant at Henderson, Nevada, which will increase its thiol capacity by 50 per cent.

Thiol is the principal intermediate in the production of Trithion, the insecticide-miticide developed by Stauffer and produced for international sale at Henderson, Nevada.

Completion is scheduled for January. Existing facilities for thiol production at Niagara Falls, N. Y. will be converted to other uses.

SPENCER LAUNCHES "OPERATION OMNIBUS"

"Don't Just Fertilize—Spencerize" is the slogan which Spencer Chemical Co. has introduced to launch and identify a brand new sales promotion program. Known

within the company as "Operation Omnibus," the program is aimed at focusing attention on the entire range of nitrogen products made by the company's Agricultural Chemicals Div.

The "Omnibus" program will be presented via farm paper, radio, fair displays and a movie entitled "Fertilizer First."

INCORPORATION

Charter of incorporation has been granted Liquid Fertilizer and Feed Corporation, liquid fertilizer, 525 Whitney Building, New Orleans, La., listing capital stock of \$100,000.

AMERICAN POTASH ENLARGES SODIUM CHLORATE PLANT

Work has begun to enlarge its \$4,400,000 sodium chlorate plant at Aberdeen, Miss., by 50 per cent, reports American Potash & Chemicals Corp.

The expansion project, which will represent an investment of approximately \$1,250,000, will raise production capacity at Aberdeen from 15,000 tons per year to 22,500 tons. Completion is scheduled for October, 1960.

THE STORY OF SULFUR.

Brimstone: The Stone That Burns, published by Van Nostrand, 120 Alexander St., Princeton, N. J., tells the story of the American sulfur industry from pioneering days in the Louisiana swamps right up to today's new sulfur recovery developments in France and Canada.

Based on a work published in 1942, the 308 page book is illustrated, and priced at \$5.95.

CHILTON PUBLISHES BOOK ON AREA SAMPLING

Handbook of Area Sampling, by John Monroe and A. L. Finkner has been published by Chilton Co.

Purpose of the book, Chilton reports, is to bring together the various definitions and procedures involved in construction of an area frame, to illustrate the use of the frame in drawing a random sample, and to show the adaptability of the materials to several commonly used sample designs.

Priced at \$3.00, the Handbook is

available from Chilton Co.—Book Div., 56th and Chestnut Sts., Philadelphia 39, Pa.

FOREST FERTILIZATION TESTS STARTED BY VPI

A fertilizer spreader at work in the forest might be an unusual sight today, but a few years hence forest fertilization might become an accepted practice.

Agronomists and foresters at Virginia Polytechnic Institute Agricultural Experiment Station are beginning a series of tests aimed at determining whether it will pay to fertilize forests.

W. W. Moschler, assistant agronomist at VPI, explains that demand for forest products is on the increase, while the supply is decreasing. Generally, the better soil types grow timber in a shorter period of time than do poorer soils. The scientists are wondering if trees will grow faster on the poorer soils after liming and fertilization.

Several fertilizer companies, commercial forest companies and private landowners have furnished some of the land, materials and financial help needed to make the studies.

The first test is in Orange county on extremely poor soil. Three acres of land have been cleared of scrub hardwood and planted in loblolly pine. There are blocks of trees with no treatment other than planting, blocks of trees which are limed, blocks that are fertilized and blocks which are both limed and fertilized. The researchers want to determine both short-term and long-term results.

Another test will be conducted in an established pine stand—perhaps one that is 10 to 15 years old and has a good stand of desirable trees, but which is too small for cutting. The scientists seek to determine if and how much growth can be speeded up, if the quality of the timber or pulp wood can be improved, and how much it will cost.

Fertilization of hardwoods will probably be a third experiment. Hardwoods take more minerals from soil than does pine, Moschler explains, and are more exacting than pine when it comes to soil fertility.

NEWS OF THE INDUSTRY

Associations Meetings

COLO. AGR. CHEMICALS ASSN. ANNOUNCES ANNUAL MEETING

Annual meeting of the Colorado Agricultural Chemicals Association will be held January 28 and 29, 1960, in the Cosmopolitan Hotel, Denver, Colo.

E. C. Stone, the Association's publicity chairman, writes that the first day there will be a closed business meeting, and the second day will be a joint meeting with the Colorado State Department of Agriculture and all interested officials of Colorado State University of Fort Collins, Colo. Interested persons in other states have been invited to attend the second day's meeting.

MINNESOTA HOLDS NITROGEN CONFERENCE

About 300 people attended the Minnesota Nitrogen conference at the University of Minnesota's St. Paul campus, August 28-29.

Paul Lindholm, president of the Minnesota Anhydrous Ammonia Dealers Association, opened the morning session August 28, when Minnesota and Wisconsin soils specialists discussed nitrogen and its relation to soils, crops, fertilizers and yields.

The afternoon session, headed by W. P. Martin, head of the soils department at the University, covered nitrogen in soil management, forage production, corn and ammonia in farm operations.

Discussion of the status and future of nitrogen in the north central states closed the conference. Jack F. Criswell, Agricultural Ammonia Institute, presided over that session.

PASTURE FERTILIZATION DISCUSSED AT KY. MEETING.

Ten times more fertilizer could be profitably used on pastures than is being applied at present, Dr. Eugene C. Doll, University of Kentucky agronomist, reported at the annual Kentucky Fertilizer Conference at Lexington.

Doll said 250 pounds of fertilizer per acre for pastures would be a realistic level for Kentucky farmers, rather than the present 25

pounds per acre average.

"Cash in on Grass," the National Plant Food Institute's sound and color movie, won high praise from the 130 fertilizer industry representatives, farmers and extension men attending the conference. Warren Thompson, extension pasture specialist at the University, said the film will be used throughout Kentucky at extension meetings this fall and winter. He added that increasing emphasis will be given to pasture improvement, renovation and fertilization in the University's extension program during the coming year.

SAFETY COUNCIL PUBLISHES "SHOWMANSHIP IN SAFETY"

"A way to inject fun, color and showmanship into your safety program"—that's how the National Safety Council describes a new, 96-page, illustrated booklet, *Showmanship in Safety*. Each page, the Council reports, contains ideas for stunts, demonstrations and promotions that will "help build interest, create favorable attitudes and bring a change of pace and a dash of color into your safety efforts."

Further information and quantity prices may be obtained from the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

HERBICIDE PROGRESS TO BE FEATURED AT CONFERENCE

Recent progress in the use of herbicides to control weeds in all phases of southern agriculture will be featured during the Thirteenth Annual Southern Weed Conference, scheduled to be held in Biloxi, Miss., Jan. 20-22, 1960.

V. S. Searcy of the Alabama Agricultural Experiment Station, Auburn, Ala., conference president, announced that all phases of research and education in chemical weed control will be reviewed during the three-day conference.

Dr. D. E. Davis of the Alabama Agricultural Experiment Station is serving as chairman of the Program Committee for the 1960 meeting.

Officers for the conference are: President, V. S. Searcy; Vice President, Dr. Robert Darrow, Texas Agricultural Experiment Station; Secretary-Treasurer, Dr. Walter K.

Porter, Louisiana State University; Dr. R. E. Frans, Arkansas Agricultural Experiment Station, is Secretary-Treasurer elect.

All sessions of the conference will be held at the Buena Vista Hotel, Biloxi.

NEW BROCHURE FOR ARIZONA FARMERS

"Arizona Farmers Profit from Fertilizer," a new brochure published by the Arizona Bankers Association in cooperation with the University of Arizona, is now off the press.

This was recently announced by Dr. Richard B. Bahme, western regional director of the National Plant Food Institute, who worked closely with these groups in preparing the 20-page booklet.

The booklet, attractively covered with a typical Arizona cotton scene in color, explains how chemical fertilizers can be used to produce higher and more profitable crop yields. It advises farmers to put modern scientific practices to work and combine them with good business principles which will return the best profit.

"This brochure, the product of the National Plant Food Institute's close working relationship with the Arizona Bankers Association and the University, is one of many projects the Institute has underway with banker associations," Dr. Bahme said. "Our purpose is to emphasize the importance of soil fertility to agricultural credit and farming efficiency."

The brochure is being distributed to Arizona farmers through banks, the agricultural extension service and through the fertilizer industry.

NPFI SUPPORTS FOREST FERTILIZATION PROJECTS

A research project on forest fertilization was initiated by the University of Georgia Agricultural Experiment Stations effective July 1. Objective is determination of the response of young slash pine to applications of certain plant nutrient elements and the effect of these treatments on wood quality. It is supported in part by a grant of \$2,600 from the National Plant Food Institute.

The School of Forestry, Raleigh, N.C., is conducting green house and

field experiments to determine whether fertilizer application will produce stimulation in the growth of planted seedlings on organic soils. NPFI has provided a grant-in-aid of \$800 to partially finance the project.

SYMPOSIUM ON CHEMISTRY OF PHOSPHATE-SOIL REACTIONS

Tennessee Valley Authority and Southern Regional Soil Research Committee (Fertilizer Evaluation Work Group) will sponsor jointly a symposium on the chemistry of phosphate-soil reactions at Muscle Shoals, Ala., January 27-29, 1960.

Morning sessions on the first two days will be devoted to the symposium. The final session on Jan. 29 includes reviews of cooperative work with states, with emphasis on fertilizer salt effects on germination and growth, and on studies with fused potassium phosphates. During the afternoon, on Jan. 27 and 28, tours of TVA's fertilizer-munitions center will be available, and sponsoring groups and cooperating states will hold planning sessions.

Speakers for the phosphorus symposium will include Drs. P. R. Stout (Univ. of Calif.), M. L. Jackson (Univ. of Wis.), N. T. Coleman (N.C. State College), Sterling Olsen (A.R.S., Colo. State Univ.), M. Peech (Cornell Univ.), M. Fried (A.R.S., Beltsville, Md.), and TVA researchers.

Soils scientists and commercial representatives interested in technical research in these fields have been invited to attend. For information on hotels, program, etc., contact George Stanford, Chemical Engineering Bldg., TVA, Wilson Dam, Ala.

PLANT MAINTENANCE AND ENGINEERING SHOW

One new aspect of the Plant Maintenance & Engineering Show, to be held in Philadelphia's Convention Hall, January 25-28, will be products and equipment used to eliminate factory pollution of air and water. Clapp & Poliak, Inc., producers of the exposition and concurrent conference, report that virtually all exhibits will emphasize cost reduction through preventive maintenance.

Advance registration cards, conference and hotel information, may

be obtained from Clapp & Poliak, Inc., 341 Madison Avenue, New York City 17.

BANKERS, FARM MANAGERS TOUR, CALIF. FERT. INDUSTRY

Northern California bankers and professional farm managers will attend a one-day tour of the California fertilizer industry and will be briefed on key processes in the production of nitrogen, phosphate and potash fertilizers on October 7. Dr. Richard B. Bahme, western regional director of the National Plant Food Institute which is sponsoring the tour and school in cooperation with the University

of California, made the announcement.

The tour will start out at the Berkeley Campus of the University of California with a briefing conference on phosphate fertilizers, followed by a tour of manufacturing facilities in the vicinity. The tour will culminate in a dinner at Spenger's restaurant in Berkeley.

NPFI'S 1960 CONVENTION

The National Plant Food Institute reports that its 1960 annual convention will be held at The Greenbrier, White Sulphur Springs, W. Va., from Sunday, June 12 to Wednesday, June 15.

Calendar

Oct. 12-14. Association of Official Agricultural Chemists Annual Meeting, Shoreham Hotel, Washington, D. C.

Oct. 13-14. Western Agricultural Chemicals Assn. Fall Meeting, Villa Hotel, San Mateo, Calif.

Oct. 14-16. Pacific Northwest Plant Food Assn. Annual Convention, Chinook Hotel, Yakima, Wash.

Oct. 15. National Plant Food Institute Conference on Chemical Control Problems, Shoreham Hotel, Washington, D. C.

Oct. 15. Meeting of States Relations Committee of the Association of American Fertilizer Control Officials, 8 p.m., Shoreham Hotel, Washington, D. C.

Oct. 16. Association of American Fertilizer Control Officials Annual Meeting, Shoreham Hotel, Washington, D. C.

Oct. 16-17. Association of American Pesticide Control Officials Annual Meeting, Shoreham Hotel, Washington, D. C.

Oct. 19-22. National Pest Control Association Annual Convention, Buena Vista Hotel and Motel, Biloxi, Miss.

Oct. 19-23. National Safety Congress, Chicago, Ill.

Oct. 21-23. National Agricultural Chemicals Assn. 26th Annual Meeting, French Lick-Sheraton Hotel, French Lick, Ind.

Oct. 27. Association of Consulting Chemists and Chemical Engineers Annual Symposium, Shelburne Hotel, New York City.

Oct. 29-30. Far West Safety School, Hacienda Motel, Fresno, Calif.

Nov. 4-5. Fifth Annual Fertilizer Dealers Conference, Stillwater, Okla.

Nov. 4-6. Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.

Nov. 8-10. National Fertilizer Solu-

tions Assn. Annual Convention, Statler Hilton Hotel, St. Louis, Mo.

Nov. 9. South Carolina Plant Food Educational Society Annual Meeting, The Clemson House, Clemson, S. C.

Nov. 9-11. California Fertilizer Assn. Annual Convention, Fairmount Hotel, San Francisco, Calif.

Nov. 12-13. Southwest Fertilizer Safety School, Tropicana Motor Hotel, Pasadena, Calif.

Nov. 16-17. Farm Chemicals Marketing Seminar, Barbizon-Plaza Hotel, New York City.

Nov. 16-20. National Aviation Trades Association Annual Convention, Hotel Monteleone, New Orleans, La.

Nov. 30-Dec. 4. 27th Exposition of Chemical Industries, New York Coliseum, New York City.

Nov. 30-Dec. 5. Joint meeting of the Entomological Society of America, the Entomological Society of Canada, and the Entomological Society of Ontario, Hotel Sheraton-Cadillac, Detroit, Mich.

Dec. 1-2. Carolinas-Virginia Pesticide Formulators Association Annual Meeting, Carolina Hotel, Pinehurst, N. C.

Dec. 7-9. Chemical Specialties Manufacturers Association Annual Meeting, Mayflower Hotel, Washington, D. C.

Dec. 7-10. North Central Weed Control Conference, Royal Alexandra Hotel, Winnipeg, Manitoba.

Jan. 6-8. Fourteenth Annual Northeastern Weed Control Conference, Hotel New Yorker, New York City.

Jan. 13-15. Agricultural Ammonia Institute Ninth Annual Convention, Statler Hilton Hotel, Dallas, Tex.

Jan. 14-16. Agricultural Aircraft Association Tenth Annual Convention, El Mirador Hotel, Palm Springs, Calif.

NEWS OF THE INDUSTRY

People

American Mineral Spirits Co.

Leon J. Breton has been elected vice president, responsible for market survey activities and consumer research. The former assistant vice president will continue to headquarter at the company's Chicago office.

American Potash Institute.

Santford Martin, editor for the institute, received a President's Citation of the Soil Conservation Society of America at that organization's recent 14th annual meeting.

Consumers Cooperative Association.

Gordon E. Hoath has been transferred to Kansas City, Mo., where he becomes manager of fertilizer manufacturing. He had been manager of CCA's fertilizer and protein plants at Eagle Grove, Ia., since 1949.

The Dow Chemical Co. has named John H. Wallberg as manager of agricultural chemicals sales for the northeastern states. In the newly created position, Wallberg will make his headquarters in New York as supervisor of that territory, as well as the Buffalo, Camden, Boston and Pittsburgh sales offices. Wallberg has been with Dow since November, 1946.

Food Machinery and Chemical Corp. has appointed R. H. F. Dade as general manager of the chemical facility it will design, construct and operate for the Army Chemical Corps at Newport, Ind. Mearlin L. Sims has been named resident manager and will be succeeded as plant manager of FMC's Nitro, W. Va. plant by Leonard G. Nussbaum, former production manager of FMC's Baltimore, Md., plant.

Hooker Chemical Corp. R. George Hartig and James D. Thaler have been named supervisors of process design and plant design respectively, for the Phosphorus Div., with headquarters at Jeffersonville, Ind. F. Leonard Bryant, Division general manager, said that the appointments are part of a new pro-

gram designed to provide continuing support for all production plants and to meet increased engineering requirements.

Joseph A. Howell, of Richmond, Va., has announced his resignation as chairman of the Fertilizer Committee for Tax Equality. He reports also that he is no longer a consultant to the National Tax Equality Association.

International Minerals & Chemical Corp.

Richard L. Chambless, former Plant Food Div. sales representative in Tupelo, Miss., becomes marketing staff assistant for the Division. He will assist in preparing field sales programs, specializing in Rainbow, IMC's premium fertilizer.

Monsanto Chemical Co. J. Paul Ekberg Jr. has been appointed to the new position of product director of agricultural chemicals, Organic Chemicals Div., after serving as assistant director of sales for that division.

Gilbert W. Miller is new production coordinator for the Organic Chemicals Div. He had been in the Technical Services Dept.

Nitrogen Div., Allied Chemical Corp. Appointments of Rein U. Mesdag and Dr. E. Peter Griffin as district agronomists have been announced by M. E. Hunter, vice president in charge of sales.

Mesdag, who succeeds Dr. Harvey J. Stangel in the Omaha, Neb. area, will service 11 Midwestern states. Dr. Griffin, who succeeds Dale Friday, will reside in Westerville, Ohio, and cover the remaining eastern half of the Midwest.

Sohio Chemical Co. Thomas P. Mericle, Jr. has just been appointed agricultural sales representative, with headquarters in Louisville, Ky. Mericle has been with Sohio since July, 1958, and most recently has been staff assistant in the agricultural sales section.

Spencer Chemical Co. Changes in top production and sales management within its Agricultural Chemicals Div. have been announced. They follow the recent election of new Spencer officers



White



Best

which saw John C. Denton, former vice president—agricultural chemicals, become president. Changes, as announced by Byron M. Kern, new vice president—agricultural chemicals, are as follows:

Jack E. Straub, former assistant to the vice president, becomes general manager of production; S. Ray White, formerly sales manager, becomes general sales manager; Francis E. Best, formerly North Central District sales manager, moves to Kansas City to become sales manager; W. Dave Van Aken, formerly Midwest district sales manager, moves to Chicago to become North Central District sales manager; Ralph Willits, formerly Minnesota sales representative, moves to Kansas City to become Midwest District manager.

Kenneth A. Keith, 43, died of a heart attack Sept. 9. He was preparing to move to Omaha to manage a new Spencer district sales office.

Texaco, Inc. James F. Coogan has been appointed advertising manager and Raymond Apy, sales promotion manager, reports S. C. Bartlett, vice president of the company's domestic sales department. Both will report to John H. Childs, newly-appointed general manager of advertising and sales promotion.

Velsicol Chemical Corp. Bernard H. Lorant, recently named as



Lorant

assistant to the president, has been assigned full responsibility for the company's over-all research and development activities. He will also continue to be in charge of the legal and patent functions.

Government

PRODUCT DEVELOPMENT BOOK PUBLISHED BY OTS

How can product development be managed to produce a new product, desired by a customer, by a date dictated by readiness for product utility and by the greatest conservation of engineering staff and money?

Considering today's research and development costs and the short life of new products as compared to a few years ago, Sidney Sobelman, chief of the Special Analysis Branch of the Army's Picatinny Arsenal, has attempted to lay out "A Modern Dynamic Approach to Product Development" in a book of that title just published by the Office of Technical Services, U. S. Department of Commerce.

The book includes chapters on "The Customer's Needs," "Product Pay-off and the Time Factor," "Evaluation and Selection of Programs," "Forecasting and Scheduling a Program," "Forecasting and Scheduling Many Programs," "The Milieu or 'Climate' for Product Development," "The Organization—Characteristics and Structure," "Funds and the Budget," and some speculation on "The Future."

The Book, PB 151649, 205 pages, may be ordered from OTS, U. S. Dept. of Commerce, Washington 25, D. C. Price: \$3.50.

TVA ISSUED 40 LICENSES IN '59, FOR A TOTAL OF 184

Forty royalty-free licenses were issued during fiscal 1959 for the use of its fertilizer processes or for the manufacture of TVA-developed equipment, TVA said recently. This brought to 184 the number of such licenses issued to 148 companies.

Sixty per cent of the licenses issued are for use of the continuous ammoniator or for the manufacture of equipment needed in the process. Eighty-six licenses have been granted for use of the process, and 21 to manufacture the equipment.

Twenty-six licenses have been granted to use the superphosphate mixer, and 11 to manufacture the equipment.

Twenty-four licenses have been issued for use of liquid fertilizer

processes developed by TVA; and 16 for use of various other patents, including those on the rotating furnace, a process to expand slag, a process for production of calcium metaphosphate, and others.

Chemicals

GENERAL CHEMICAL DIV. MARKETS NEW LARVACIDE

A new larvacide for control of fly maggots under poultry cages is being introduced by Allied Chemi-

cal's General Chemical Div. Trade-named "Kilmag," the product is reported to give almost 100 per cent control in tests on house fly larvae.

"Kilmag" is a new calcium arsenate compound formulated of unusually small particles and suspending agents that are said to give it penetrating ability and enable it to work effectively in small quantities of water.

In use, two pounds of the product are mixed in four gallons of water. This amount is sufficient for treat-

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MODEL FB-T

DORSEY BULKMASTER SELF-UNLOADING TRANSPORT

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The versatile unit pit dumps or can be equipped with 14-foot folding or rigid full-swiveling 18"-wide endless-belt conveyor. Discharge is in excess of a ton per minute. Other outstanding features include:

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- REAR FENDERS WITH MUD FLAPS
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- STEEL SPOKE WHEELS
- TWO-SPEED LANDING GEAR

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RUSH literature on the Model FB-T

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CITY AND STATE _____

NEWS OF THE INDUSTRY

ment of 1,000 square feet of manure. A coarse spray is applied with a low gallonage, light-weight sprayer. Control is maintained by spraying every seven days.

CLIMAX INTRODUCES MOLY-GRO FOLIAR SPRAY

Climax Molybdenum Co. reports that its new product, Moly-Gro Foliar Spray compound, is expected to find use in spraying truck crops, citrus trees and perennial legumes. The compound contains 38.4 per cent active molybdenum and is water-soluble.

Molybdenum sprays are used to control yellow spot, a deficiency disease which attacks the leaves of citrus trees, and whiptail in cauliflower, according to Climax.

DIAZINON LABEL CLAIMS ACCEPTED FOR MORE CROPS.

Eighteen more fruits and vegetables have been added to the list of crops for which Diazinon insecticide has received label claims acceptance, bringing the total list to forty-five. Geigy Agricultural

Chemicals reports that those newly-accepted are grapes, cantaloupes, carrots, collards, cranberries, endive, kale, lima beans, muskmelons, parsley, parsnips, radishes, summer and winter squash, Swiss chard, turnip roots and tops and watermelons. Residue tolerances of 0.75 ppm have been established on these crops.

U. OF CAL. STUDIES DRYLAND RANGE FERTILIZATION

Southern California's first major study of dryland range fertilization indicates the practice can be profitable if rainfall conditions are right.

In a two-year experiment, 300 pounds of ammonium sulfate per acre was applied to 76 acres of rangeland at the Santa Rosa Ranch near Murrieta. One hundred-eighty acres were kept as the unfertilized check. In 1958 results were as follows:

- 1) Approximately twice as many cattle per acre could be pastured on the fertilized as on the check area.
- 2) The grazing season was lengthened. Fertilized range was

ready to receive cattle about three weeks earlier in the fall.

3) Quality of native grasses on fertilized range was improved.

4) Net profit from fertilizing was \$2.72 per acre.

The success of fertilization depends on near-normal rainfall, notes Technician Arthur E. Laag of the University of California, Riverside. In 1959 results were negative because of the dearth of rain. Fertilization resulted in a net loss per acre because the growth-stimulated plants couldn't make maximum use of fertilizers when rain failed to arrive to support their growth, says the Riverside researcher.

The experiment was in cooperation with Charles Gerhart of the Soil Conservation Service, the Vail Co., Shell Chemical Corp. and USDA's Agricultural Research Service.

Remember . . .

"FCMS"

details on page 28

MONARCH SPRAYS



This is our Fig. 645 Nozzle. Used for Scrubbing Acid Phosphate Gases. Made for "full" or "hollow" cone in brass and "Everdur." We also make "Non-Clog" Nozzles in Brass and Steel, and

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COTTON PESTS RESIST SOME INSECTICIDES IN TESTS

Boll weevils and cotton fleahoppers have been shown by USDA scientists to resist chlorinated hydrocarbon insecticides normally used for their control in the cotton-producing area of central Texas.

Results from 1958 tests on several central Texas farms confirm the widespread nature of boll weevil resistance, and include the first evidence in the United States of resistance by the cotton fleahopper, according to workers of USDA's Agricultural Research Service. ARS scientists C. R. Parencia and C. B. Cowan, Jr., also demonstrated that effective control of the pests can be achieved with phosphate and carbamate insecticides as well as with a 2:1 combination of toxaphene and DDT.

1958 Test Results

Tolerance of weevils to dieldrin and toxaphene had increased to such a degree, USDA said, that satisfactory control of heavy infestations with these insecticides was impossible during the 1958 tests. Since 1955, cotton growers in some areas of Louisiana, Mississippi, Arkansas and South Carolina have been reporting similar experiences in trying to accomplish weevil control.

Cotton fleahoppers resisted test dosages of dieldrin, heptachlor and toxaphene at strengths up to three times more concentrated than those previously used to maintain control, the scientists reported. Populations of young fleahoppers increased on the infested plants during treatment with these insecticides, showing that lack of control was not due to new migrations of adults in the area.

Toxaphene and Sevin

In one experiment, a previously effective dosage of toxaphene reduced the population of overwintering weevils only 65 per cent and failed to establish effective control over cotton fleahoppers. On the other hand, Guthion, an organic phosphate, and Sevin, a carbamate, were reported to give a 90-100 per cent reduction in weevil

population and good control of the fleahopper. Of the total squares examined about a month after initial treatment, scientists found an average of 8.4, 7.6 and 22.6 per cent weevil-infested squares in the plots treated with Guthion, Sevin and toxaphene, respectively.

Toxaphene-treated plots in the same test yielded 300-400 fewer pounds of seed cotton per acre than those treated with Guthion and Sevin.

DIPTEREX SHOWS PROMISE IN BOTFLY CONTROL

An organic phosphorus insecticide has demonstrated effectiveness in experiments to control two species of botflies commonly parasitizing horses in the United States, USDA reports.

The insecticide is Dipterex—chemically 0,0-dimethyl 2,2,2-trichloro-1-hydroxyethylphosphonate. Because tests are still in the experimental stage, use of Dipterex to control botflies of horses is not recommended at this time.

USDA scientists at Kerrville, Tex., found that Dipterex, added to feeds in dosages of from 37.5 to 40 milligrams per kilogram of animal weight, was practically 100 per cent effective in expelling botfly larvae in all growth stages from the bodies of horses.

Applied by stomach tube or intermuscular injections, Dipterex and other insecticides tested failed to give comparable control of the pests.

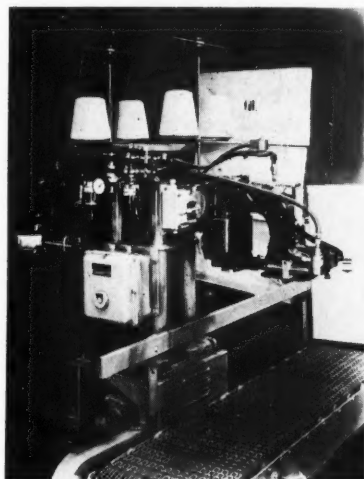
EMULSIFIABLE KORLAN REGISTRATION GRANTED

The 24 per cent emulsifiable form of Korlan has been granted registration for use as a spray on cattle, sheep and goats for control of external parasites, The Dow Chemical Co. reports.

Under terms of the registration, Korlan 24E is now being recommended as a half per cent spray for controlling hornflies, lice and screwworms on cattle and calves and as a three-quarter per cent spray for lone star and winter tick control. On sheep, goats, lambs and kids the half per cent spray may be used to control lice, sheep keds (ticks), screwworms, fleeceworms (wool maggot or flystrike) and hornflies.

Equipment Supplies

DUAL HEAD SEWING STAND TO CLOSE MULTIWALLS



A dual head sewing stand, designed for use in closing open-mouth multiwall bags, has been announced by Union Bag-Camp Paper Corp. This latest addition to the Union I&C packaging machinery line accommodates either the 80600E or 80600H sewing head.

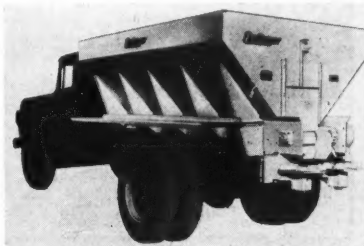
With the dual head stand, if one sewing head breaks down the other can be swung into place without any loss of production, according to the manufacturer. For more information,

CIRCLE 321 ON SERVICE CARD

SINGLE OR DOUBLE SPINNERS AVAILABLE ON SPREADER

The Challenger, a PTO driven, lime and fertilizer spreader, is available with single spinner and 18" conveyor or double spinners and a 24" conveyor, according to Highway Equipment Co., its manufacturer.

The Challenger is a positive feed, self-unloading spreader. Conveyor and spinner system operates off the



NEWS OF THE INDUSTRY

PTO. Body capacities range from 4.6 cu. yd. on the low cost 9' single spinner body to 8.8 cu. yd. on the 15' double spinner model.

More information including literature and complete specifications, may be obtained by

CIRCLING 322 ON SERVICE CARD

PIPER PRODUCES PAWNEE FOR AERIAL APPLICATION

Designed specifically for the aerial application of chemicals, the Piper Pawnee is now in full production at Piper Aircraft Corp.'s Lock Haven, Pa. plant.



Designated the Model PA-25, the Pawnee is a low-wing, 150 hp airplane. It has a useful load of 1,100

FOR SALE: 1800 cu. ft. T304 SS weigh hoppers. (3) 18,000 gal. Alum. tanks. (10,000')—T316 SS pipe—1", 2", 3" up to 12". Perry Equipment Corp., 1430 N. 6th St., Phila. 22, Pa.

FOR SALE: (2) 7750 gal. and (5) 4650 gal. phenolic lined horizontal storage tanks. Excellent for liquid fertilizer storage. Best Equipment Corporation, 1737 W. Howard St., Chicago 26, Ill. AMBassador 2-1452.

\$3,000,000 Liquidation Chemical Plant at Orange, Texas. Type 316 Stainless Steel Tanks, Kettles, Heat Exchangers, Columns, Stills, Crystallizers, Centrifugals, Pumps, Valves, etc. Wonderful values. Send for list. Perry Equipment Corp., 1430 N. 6th St., Philadelphia 22, Pa.

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pounds, a hopper capacity of 150 gallons or 20 cubic feet. The pilot's cockpit has been placed as far aft as possible for safety, and as high as possible for maximum vision.

Power plant package is the same as the Piper PA-22; landing gear is similar to that of the Piper Pacer. Tri-Pacer axles, Comanche wheels and brakes, and Apache tires are used.

The hopper tank is constructed of polyester plastic reinforced with fiber glass. For more information, just

CIRCLE 323 ON SERVICE CARD

NEW POLYETHYLENE FILM FOR INDUSTRIAL BAGS

Chippewa Plastics Co. reports development of a super-tough polyethylene film for its industrial bag, permitting a 40 per cent reduction in the gauge of the material for the heavy-duty bag. The new bag is expected to be used for shipping and storing ammonium nitrate fertilizer, peat moss, hybrid seed corn and other materials requiring absolute moisture protection.

Chippewa researchers say the bag appears to have improved puncture and snag resistance despite its thinner walls. It incorporates also the "Chipp-a-Weld" seal, reported to bring the strength of sealed areas virtually up to the strength of the bag itself.

Further information can be secured by

CIRCLING 324 ON SERVICE CARD

PELLETIZING-MIXING DISCS FROM DRAVO

Production of a standard line of pelletizing-mixing discs for continuous agglomeration and mixing of a wide variety of fine granular solids has been announced by Dravo Corp. The discs will be made in four basic sizes—3'3", 8'6", 12' and 16'6" diameter.

Among materials successfully pelletized in the Dravo Research Center have been ammonium sulfate, phosphate rock fines, common salt, molybdenum trioxide, and lime.

This experience indicates that most fine materials can be pelletized to any size from 1/16 inch to 1½ inch.

Details are available by

CIRCLING 325 ON SERVICE CARD

Suppliers Briefs

Allis-Chalmers Mfg. Co. Robert L. Koob joins the firm as director of public affairs, to act as a consultant on governmental affairs to all divisions of the company.

C. O. Bartlett & Snow Co. has acquired the entire Wettlaufer line of vibrating screens, packing units, blender mixers, granulators and centrifuges.

Bemis Bro. Bag Co. T. V. Scott, director of eastern operations and company director, transfers to St. Louis as assistant director of sales for the company. A.F.G. Raikes assumes Scott's duties as director of eastern operations, and is succeeded as manager of New York general sales division by J.B. Goolsby.

Bemis has announced plans for construction of a modern one-story manufacturing plant in the San Francisco Bay area.

Chase Bag Co. moves its executives offices on October 1 to the recently completed 22-story office building at 355 Lexington Ave. in New York. F. H. Ludington, president, said the new offices will provide added space to handle the increased packaging requirements of Chase customers. The company will occupy the entire 13th floor and half of the 12th.

Chippewa Plastics Co. George Dingman has been appointed general manager. Dingman, who joined Chippewa in 1955, most recently was director of purchases and planning.

Continental Can Co. has named L. G. Cannella products sales manager of non-food cans.

Gilman Paper Co. H. C. Lawless, vice president and director of sales for Gilman and its subsidiaries, Kraft Bag Corp. and St. Marys Kraft Corp., announces appointment of H. D. Wellington to the newly created post of assistant general sales manager, with headquarters in New York City.

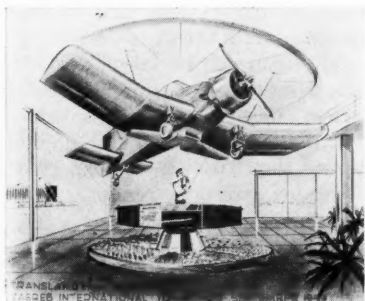
Highway Equipment Co. Lakeside Truck Body Co., Turlock, Calif. is a new distributor, serving California north of and including the counties of Monterey, Kings, Tulare and Inyo.

St. Regis Paper Co. During a recent visit to St. Regis Paper Co.'s Toledo bag plant, members of the fertilizer division of Ohio Farm Bureau Cooperative Association are shown some of the photographic equipment used to reproduce the printed material that appears on multiwall bags which package their products. The tour wound up the Bureau's annual meeting of management, sales and production personnel held this year in Toledo. Left to right are Rae Perkins and



Lynn Willoughby, St. Regis; C.N. Griffith and Dennis Lehman of the Bureau; and Harry Walker, of St. Regis.

Transland Aircraft. The Transland Ag-2 farm and forest airplane was displayed in the United States Pavilion at the International Trade Fair at Za-



greb, Yugoslavia, Sept. 5-20. Transland's president, George S. Wing, indicated that the plane will be demonstrated in Europe, the Near East and North Africa before it returns to the U.S.

Yale Materials Handling Div., The Yale & Towne Mfg. Co. John P. Horan has been promoted to market research manager. He succeeds Frank P. Minnelli, recently named director of planning for the company.

Patent Reviews

(Continued from page 49)

STABILIZATION OF THE SOIL

U.S. 2,893,166, issued July 7, 1959, to George R. Bauwin and Frank X. Grossi, assigned to Union Starch & Refining Co., discloses a method of producing a stabilized soil having an improved structure permitting water to infiltrate readily in it, to allow excess water to be removed quickly from it, and to permit the exchange of gases through its pores. Dispersed in the soil, in an amount equal to 0.01% to 0.1% based on the weight of soil, is a quaternary nitrogen salt having directly attached to the quaternary nitrogen two substituent groups each of which contains 6-22 carbon atoms in a straight chain.

CONTROLLING N CONTENT IN AMMONIA SYNTHESIS GAS

U.S. 2,894,821, issued July 14, 1959 to Earl W. Jordan and Weller R. Pierce, assigned to Phillips Petroleum Co., relates to a continuous process for the control of nitrogen content in ammonia synthesis gas.

The nitrogen content of the feed gas to the ammonia synthesis process is continuously controlled by regulation of the volume of air introduced to the secondary reformer.

CONTINUOUS MANUFACTURE OF FERTILIZERS

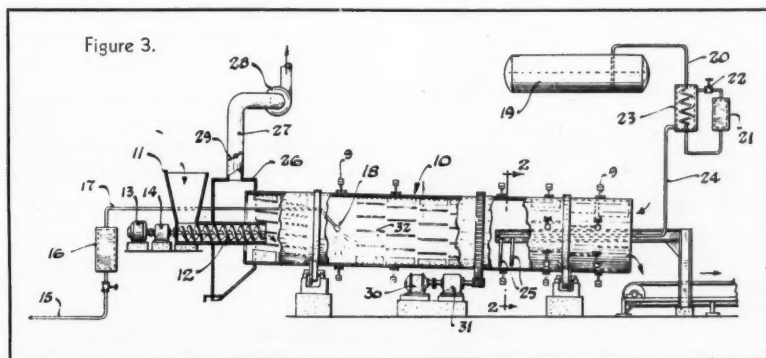
U. S. 2,885,279, issued May 5, 1959 to Everett N. Mortenson, assigned to Swift & Co., describes a process for the continuous manufacture of fertilizers, in which mineral acids and alkalies are reacted within or in the presence of carriers such as solid fertilizer ingredients of the superphosphate type.

As shown in Fig. 3, superphosphates or similar fertilizer solids are charged into mixer 10 through surge hopper 11 having a screw discharge conveyor 12 operated by a motor 13. A variable speed drive arrangement 14 can be set to maintain the desired uniform delivery of fertilizer solids to the mixer.

A valved line 15 connects an acid reservoir, not shown, with rotameter 16. This in turn is joined by line 17 to nozzle 18.

At the discharge end of the mixer 10 a liquid ammonia supply tank 19 is joined by means of submerged take-off line 20 to rotameter 21. Throttling valve 22 is placed between the rotameter and heat exchanger 23 surrounding the line 20. Line 24 provides communication between the heat exchanger and steel claws 25.

Enclosing the inlet end of the mixer 10 is a breeching box 26 connected by a duct 27 to exhaust fan 28. The duct is fitted with an adjustable damper 29. Finally, the mixer is provided with means for rotation. A motor 30 and gear drive arrangement 31 are illustrated. Suitable water injection means may be provided at the inlet end of the mixer. However, it is preferred simply to allow dilute acids or pre-moistened solids to supply the necessary water. ▲



PEST REPORTS

By Kelvin Dorward*

VECTOR OF HOJA BLANCA FOUND IN LOUISIANA

The only known vector of the *hoja blanca* disease of rice was found in Louisiana for the first time in late July. This planthopper, *Sogatia orizicola*, was first found in St. Tammany parish. The disease was discovered shortly after the initial find of the carrier. Through August the vector and/or evidence of the disease had been found in five rice fields totaling approximately 300 acres in St. Tammany parish, in one field of 260 acres in St. James parish, and in one field of 140 acres in Iberville parish.

The vector, as well as the disease, was first found in the United States in an experimental plot of rice at Belle Glade, Florida, in the fall of 1957. Two additional infestations of 40 and 240 acres were also found in the same area later that year. In September 1958 the vector and disease were found in two fields in Hancock county, Mississippi. One field was of volunteer rice and the other a 60-acre planted field. Finds of the vector or disease were made in the Belle Glade, Florida, area in 1958 and in January 1959, but no further finds have been made in Mississippi. In all cases, eradication measures were undertaken immediately after finding the insect or disease.

Hoja blanca disease, a virus dis-

Cotton gin trash is screened through this machine and inspected for pink bollworm larvae. This is an important method of detecting the pest. Light traps are used in surveys for pink bollworm moth.

USDA photo

order capable of seriously damaging this country's \$200 million rice crop, was first found in the Western Hemisphere in Cuba in 1954. In addition to the United States records, it is now known to be in Cuba, Venezuela, Panama, Costa Rica, the Dominican Republic, Dutch Guiana, El Salvador, Guatemala and Colombia. In Cuba and Venezuela, yield reductions in affected fields have been estimated to be as high as 75 per cent. An outbreak in Cuba in 1956 caused loss of 25 per cent of the rice crop.

ARIZONA PINK BOLLWORM ERADICATION PROGRAM

The *pink bollworm* eradication program initiated in 1958 in central Arizona following the finding of the insect in Maricopa county, was continued in 1959. The program, a cooperative undertaking of the Plant Pest Control Division, U. S. Department of Agriculture, the Arizona Commission of Agriculture and Horticulture, the cotton industry and farmers, was conducted in Maricopa, Pima and Pinal counties this year.

Insecticide applications began May 15, 1959, and were completed July 14. Eight applications either in dust or spray form were applied to 75,000 acres. DDT, at the rate of 2 pounds actual per acre for the first four applications and 3.75 pounds per acre for the remaining applications, was used. Sulfur was incorporated into the dusts as a miticide.

As of August 31 no pink bollworm moths or larvae had been taken within the treated area. Twelve moths, consisting of single catches, had been trapped outside the treated areas but within the regulated area.

LIVESTOCK PEST APPARENTLY BECOMES MORE WIDESPREAD

A *muscid fly*, *Musca autumnalis*, an insect known to be in this country since 1953, only this year is re-

ported as being seriously annoying to livestock. The first record in the United States was from Long Island, New York, in 1953. Last month the known distribution in the United States was listed as Illinois, Indiana, Maine, New York, Ohio, and Virginia.

During August and early September the insect was reported from Massachusetts, Michigan, New Hampshire, Vermont and Pennsylvania. In McKean county, Pennsylvania, the flies became so abundant in one instance that a white horse had to be kept in the barn. Reports of flies, suspected of being this species, were received from New Jersey and West Virginia.

Majority of the reports received refer to the fly as annoying to cattle, but horses and sheep also are listed. The fly does not enter barns, which makes residual barn sprays of little consequence in control.

The larvae develop in cow dung and various other kinds of excrement and pupation occurs in the soil around the excrement. Adults suck blood and other exudations from the surface of mammals, but cannot pierce the skin.

GENERAL INSECT ACTIVITY

Perhaps the most outstanding insect outbreak to occur during August was that of the *corn earworm* on soybeans in Virginia. By the latter part of the month soybeans in the eastern and southeastern parts of the state were being heavily damaged by larval defoliation, destruction of pods and feeding on flowers. Controls were needed in many cases and unless applied the situation was expected to become extremely serious.

The *green cloverworm* was also responsible for some soybean damage in southeastern Virginia and on the Virginia Eastern Shore and was prevalent on the crop in Kent and Sussex counties, Delaware. Illinois, Missouri and Nebraska reported the insect attacking soybeans in various degrees of intensity.

In eastern South Carolina a com-

FARM CHEMICALS

*Chief Staff Officer, Survey & Detection Operations, Plant Pest Control Div., Agricultural Research Service, USDA.

Secrets of a leader

(Continued from page 24)

backs up research to the hilt. Few industrial firms in any field can match its record for pioneering development. It has an enviable record of "firsts" in its relatively short 52-year history—some of which are credited with changing the course not only of the chemical industry but of agriculture as well. If these sound like bold observations, here's some evidence.

The company founder, Engineer Frank Sherman Washburn, introduced into the Western Hemisphere the first commercially feasible process for producing synthetic nitrogen for fertilizer. The process was the Frank-Caro method of fixing atmospheric nitrogen in calcium carbide to form a new compound, calcium cyanamide. Cyanamide not only provided the name for the company (common usage dropped the "e") and played a major role in development of the modern fertilizer industry, but sprouted a dazzling tree of useful chemicals—a major breakthrough in the fascinating world of chemistry.

With the development of this compound, Cyanamid was one of the few companies which recommended a plow-down practice using calcium cyanamide for soil-building purposes in the early 1930's. Significantly, Cyanamid has promoted soil-building with balanced plant food ever since. In the mid-thirties, the company found that cyanamid could be used for killing weed seeds in plant beds and pioneered a new method of chemical weed control. It also proved to be the first true defoliant which actually removed leaves and facilitated the harvest of cotton by machine and hand pickers.

After World War II, which was spent on wartime needs, Cyanamid introduced the first widely used phosphate-based insecticide, parathion, and led the way toward its safe use. Four years later, in 1952, it came out with the safer malathion, which now has

more residue tolerances established than any other insecticide. Another of Cyanamid's phosphate-base insecticides, Thimet, introduced for the first time in 1956, has opened up an entirely new concept of systemic insect control: the protection of plants from the inside out. Furthermore, Thimet gives promise of one-application, long-period insect control.

THE RESEARCH SUCCESS SECRET

Cyanamid's secret of research success is based primarily on a vast screening process. Having synthesized one useful compound, it conducts an intensive program of screening to find other uses. This embraces both never-ending practical application tests, along with basic research and molecule-juggling.

From this procedure, malathion was developed from parathion (in efforts to find a "safe" phosphate insecticide with the potency of parathion). Thimet and Cyrex were developed by pursuing further the possibilities for phosphates in insect- and weed-killing fields. Cyanamid defoliant was the result of screening all possibilities for calcium cyanamid, and so on.

As a fertilizer producer, Cyanamid has many types of products, including calcium cyanamid, ammonium nitrate (one of the first producers), anhydrous ammonia, ammonium sulfate, nitrogen solutions, and urea. Its fertilizer sales policy is based on selling service and quality, emphasizing farmer education for more efficient crop use.

For example, trained people were sent into orchards using parathion to take blood samples to be tested for specially established laboratories to test for absorption. Also, dealers are instructed not to sell insecticides unless customers are willing to follow labor instructions.

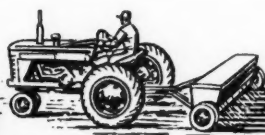
Armed with a vast research technical development and marketing operation, American Cyanamid expects to maintain its diversification leadership in the years ahead. ▲

PESTS (Continued from preceding page)

bination of lepidopterous larvae were responsible for an outbreak on soybeans which, by the first of September, appeared to be developing rapidly.

Corn leaf aphids continued to be heavy in several areas during August. States reporting unusually high populations of the insect included Delaware, Ohio, Indiana, Minnesota, North Dakota, Utah, Idaho, California and Arizona.

Lygus bugs were causing grave concern to cotton growers in Arizona during August. The pests were a problem throughout the cotton growing areas of the entire state, and in some sections heavy reduction in yield was expected. Counts of punctured squares ranged from 20-60 per cent. Some areas of California also reported economic populations. ▲



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► *When the American Chemical Society met at Atlantic City, N. J., Sept. 13-18, its Division of Fertilizer and Soil Chemistry held sessions on four days.*

► *Among the many fine papers presented were those abstracted below.*

Effect of muriate of potash particle size on granulation characteristics of a 5-20-20 fertilizer.

Edwin C. Kapusta, United States Potash Co., Div. of U. S. Borax and Chemical Corp.

The growing practice of fertilizer granulation has focused increased attention on the properties of the solid and liquid plant food sources used in fertilizer formulation. Coarse forms of muriate of potash have found increased acceptance in the granulation of low nitrogen—high potash content mixed fertilizers. Plant scale tests were made to study the effect of muriate of potash particle size on the granulation characteristics and physical and chemical properties of a 5-20-20 fertilizer, one of the most popular low nitrogen-high potash fertilizers.

Studies were carried out under typical operating conditions in commercial fertilizer plants employing continuous and batch type granulation units. Product temperature, moisture content and particle size distribution were determined at various points in the process. Recycle rates were measured. Distribution of plant foods in the finished products was investigated.

Economies of plant operation were enhanced by the use of the more coarsely divided muriate of potash products. Sulfuric acid and moisture requirements decreased and lower recycle loads resulted from the use of the coarser muriates. Also, desired production rates were more easily attained and maintained. Plant food distribution was less uniform when coarse muriates of potash were employed. The use of finely divided muriate resulted in a more uniform plant food distribution, but the fertilizer product contained less than the desired quantity of potash.

Research in Maryland on chemical methods for determining available phosphorus and potassium in soils. *James R. Miller, Department of Agronomy, University of Maryland.*

A number of different chemical methods for determining available nutrients in soils are now in use by soil testing laboratories in this country. In order to correlate under Maryland conditions several of these methods with crop response data, a pot culture experiment and several field experiments were conducted in Maryland.

There was often little difference between the correlation coefficients obtained for the various chemical methods that were used to determine phosphorus in the soils. However, when all the soils in the investiga-

tion (those treated with either rock phosphate or superphosphate) were considered, a proposed method employing sulfuric acid and ammonium fluoride as an extractant apparently showed the closest relationship with crop response. The soil series determined to a large extent the correlation obtained between available phosphorus and crop response data. The quantities of 20 per cent superphosphate required to establish similar levels of chemically available phosphorus in the different soils varied in some cases by a ton or more.

Levels of extractable phosphorus in the soils for the different chemical methods at which phosphate applications often failed to increase the yields of alfalfa in the pot culture experiments were: 55 pounds per acre, modified Troug; 55 pounds, Bray and Kurtz No. 1; 35 pounds, sodium bicarbonate; and 70 pounds, the proposed method. The thermal method proposed by Kolterman and Troug showed some promise for determining the relative potassium-supplying power of soils.

Determination of total nitrogen and nitrogen distribution in fertilizer solutions. *Jack D. Slater, John S. Hill and Donald C. Sesso, Grand River Chemical Div., Deere and Co.*

During the blending or formulation of high nitrogen fertilizer solutions containing more than one compound as a supplier of nitrogen, it is necessary that the concentration of all nitrogen-containing compounds in the solution, as well as the total nitrogen content, be quickly and accurately known.

To accomplish a quick and rapid analysis, a method has been devised and tested for the successive determination of the urea, ammonia, and nitrate concentration of a selected sample. The method consists of a fairly rapid urease hydrolysis of the urea, followed by direct titration of the ammonium carbonate formed. The ammonia due to the urea, and any ammonia originally present, are next distilled into saturated boric acid solution. The ammonia found by subsequent titration is corrected for the ammonia from urea. Last, the sample solution remaining is diluted, treated with Devarda's alloy, and again distilled into boric acid solution for titration and estimation of nitrogen content.

The method is applicable to urea-water solutions, urea-ammonia-water solutions, and urea-ammonia-ammonium nitrate-water solutions. With a suitable sampling technique, which has also been tested, solutions with widely varying concentration ranges may be successfully analyzed with a precision and accuracy comparable to other reported methods. ▲

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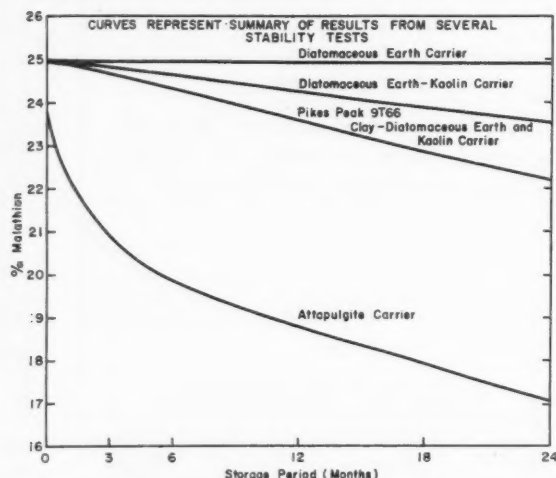
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PRODUCTION METHODS

STABILITY RESULTS—Malathion 25% dust concentrates. Room temperature storage (approx. 25° C.)



INTRODUCTION

The broad spectrum insecticidal activity of malathion along with its safety and lack of persistent toxic residue have been impelling factors in the widespread use of this material. Malathion is now registered for control of over 115 insects on more than 85 crops. It can be applied on practically all major crops, around and inside dwellings, and directly on pets, poultry and livestock including lactating cows. It shows considerable promise against insects attacking stored commodities and was registered recently as a protectant treatment on stored grain. As a result of its safety and high insecticidal activity, malathion is also an important material in the eradication or control of insect pests attacking or indigenous to man.

As might be expected, many different formulations of malathion are used commercially. Both satisfactory field performance and shelf life characteristics have been noted in most cases. Grade deficiencies reported recently by control officials in some sections of the country, and primarily on dilute dusts, have led to an intensive reinvestigation of both formulation and analysis of the major malathion formulation types.

As pointed out in the references cited, (1) (2), proper formulation, packaging and storage are prime prerequisites for good shelf life expectancy. For meaningful results analytical control work must, of course, also be carried out in an adequate and exact manner. It is planned to report information on the latter point at the 1959 A.O.A.C. Meeting in Washington, D. C.

FORMULATIONS

Since relatively few stability problems have been encountered with malathion liquid formulations the ensuing discussion will be mainly on wettable powders, dust concentrates and dilute dusts.

A knowledge of the inherent properties of malathion and the carriers and diluents used is essential to produce formulations having both good shelf life expectancy and satisfactory physical characteristics.

FORMULATION of dusts and p

Malathion is relatively stable in neutral or moderately acidic media. In the absence of moisture it also can be formulated satisfactorily on mildly alkaline surfaces. In the presence of moisture, however, base-induced hydrolysis is rapid even at a pH just above neutrality.

Another important factor in the successful preparation of stable malathion formulations is the nature of the carrier surface. Surfaces which tend to be catalytic, i.e., contain metallic ion, metallic oxide or other surface "hot spots", may contribute to malathion breakdown during long-term storage. Effects are especially pronounced in dilute formulations prepared directly on highly sorptive clays.

Perhaps the most important factor in the stability of malathion formulations is temperature encountered during storage. Very recent but incomplete information from our laboratory verifies earlier findings showing that numerous powder type formulations of malathion can be prepared having good shelf life when stored at 25°C. However, selection of carrier and diluent becomes very critical at more elevated storage temperatures, especially in the 37°C. to 45°C. temperature range. Hence, formulations should be stored in as cool a location as possible. Where relatively high storage temperature is anticipated, formulation ingredients should be carefully selected and blends prepared to minimize moisture effects, acid-base effects and carrier surface influences.

Use of carriers having low moisture content and of known unit weight (actual weight of carrier in bag or weight of carrier charged to blender) is also essential to the successful formulation of malathion. Based on our present knowledge, calcined carriers, notably clays, should not be used with malathion if they have picked up appreciable moisture (more than 2 per cent) during storage following calcination. Such rewetted carriers are a suspect source of malathion breakdown during storage, especially at the more elevated temperatures. Also, these carriers, if not reweighed just prior to their use in formulation, can introduce a source of error, often up to 10 per cent, due both to simple dilution by the water picked up on the carrier surface and to overages when packaged by the carrier manufacturer.

Containers having good moisture barriers are recommended for formulations that are to be stored in high humidity and high temperature areas. Excessive losses of insecticide from the hydrolytic action of moisture entering through the container and vaporization loss of the insecticide proper must be avoided.

Adequate blending of malathion powder formula-

ON of MALATHION and powder concentrates

tions is also important. Application of the insecticide should be carried out in such a manner as to avoid loss due to spray or mist drift. Use of a coarse spray in a relatively closed formulation system is recommended. All formulations should be analyzed for malathion content immediately after preparation to be sure that the concentration of malathion desired has actually been applied.

Overages of malathion are suggested (5 to 10 per cent of amount desired) as an insurance measure against grade drops that may occur during long-term storage, particularly for formulations to be held at temperatures much above room temperature.

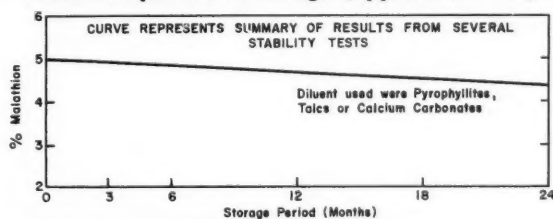
Detailed information on proper choice of carrier for use in malathion formulations is available from the basic manufacturer upon request (3). Some background information on choice of carrier for both malathion powder concentrates and dilute dusts is summarized in the accompanying graphs. Although ambient temperature plays an important role it has been found in general that diatomaceous earth, acidic kaolins and Pikes Peak 9T66 clay are the most satisfactory sorptive carriers for use in the preparation of concentrates. For best results sorptive carriers present in powder formulations should be essentially saturated with malathion. Under no circumstances should dilute dusts be prepared directly on sorptive carrier types. Such preparations deteriorate rapidly even at 25°C. The desired procedure to be followed in the preparation of dilute dusts is dilution of preferred concentrates using selected non-sorptive diluents. Materials found satisfactory for use in dilute dust preparations include pyrophyllites, certain neutral talcs, frianites, and C.C.C. diluent, a calcium carbonate. Poor stability has been found for formulations prepared on attapulgite carriers.

As shown, excellent shelf life is found for low concentration dusts prepared directly on selected non-sorptive diluents. Sorptive capacity, however, may be a serious limiting factor for dusts made in this manner.

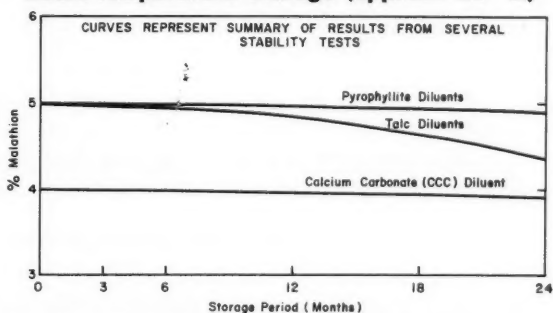
Considerable additional studies are now in progress in our laboratory on the effect of temperature, concentration of malathion present, moisture content of formulation and carrier type on shelf life characteristics of the malathion formulations. Information obtained to date verifies the earlier findings reported in this paper.

*Agricultural Division, American Cyanamid Company.

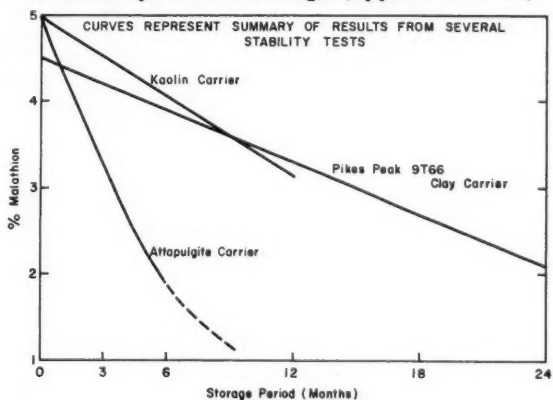
STABILITY RESULTS—Malathion 5% dusts. Room temperature storage (approx. 25° C.)



STABILITY RESULTS—Malathion 4 and 5% dusts prepared directly on non-sorptive diluents. Room temperature storage (approx. 25° C.)



STABILITY RESULTS—Malathion 4.5 and 5% dusts prepared directly on sorptive carriers. Room temperature storage (approx. 25° C.)



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2. "Home Garden Pesticides with Malathion" by G. L. Mack, Department of Food Science and Technology, Geneva, N. Y., reprinted June 1959 Farm Research, Vol. XXV No. 2
3. American Cyanamid Company, 30 Rockefeller Plaza, New York 20, New York ▲

FERTILIZER and PLANT NUTRIENT CONSUMPTION

USDA's annual report on "Consumption of Commercial Fertilizers and Primary Plant Nutrients in the United States, year ended June 30, 1958" in its entirety

By WALTER SCHOLL,
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*Fertilizer Investigations Research Branch,
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ville, Md.*

THE CONSUMPTION of fertilizers and primary plant nutrients (N, P_2O_5 , K_2O) is reported by individual states, the District of Columbia, Hawaii, and Puerto Rico, for the year ended June 30, 1958. Data for Alaska were not available. It is thought that less than 2,000 tons of fertilizers are being used there which are not included in these totals.

The data were compiled from information furnished by manufacturers on the tonnages of each kind and grade of product shipped to agents, dealers, and consumers

in all the areas tabulated except California, Florida, Massachusetts, Missouri, North Carolina, South Carolina, Texas, and Virginia. The data for these states were compiled chiefly from the reports of the respective fertilizer-control officials. Supplementary information was supplied by state agencies and fertilizer brokers. Special inquiries were made of all known distributors and custom applicators of anhydrous ammonia and nitrogen solutions.

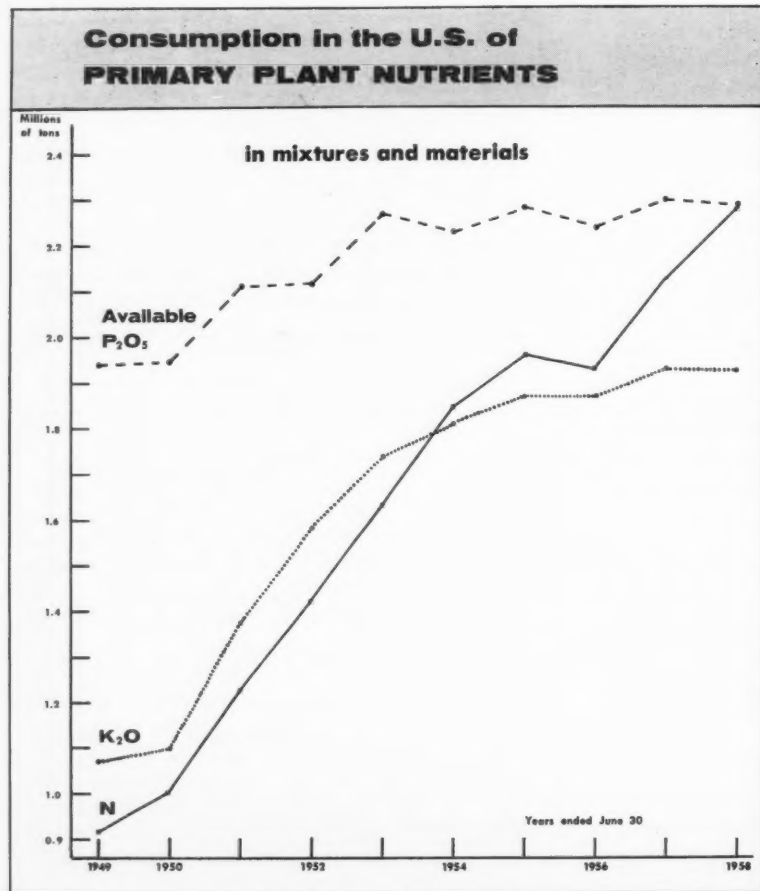
The quantities of N, P_2O_5 , and K_2O are based on the average analyses of samples of the products as reported by fertilizer-control officials of the respective state in which they were consumed, rather than on the manufacturers' guarantees. Thus, the overruns or underruns of nutrients from the guarantees are taken into account.

Quantities are reported as 2,000-pound tons. Although the data refer to shipments, the terms "consumption," "sales," and "shipments" are used synonymously. Actual consumption differs slightly, no doubt, from either shipments or sales.

ALL FERTILIZERS

The total quantity of fertilizer consumed in the year ended June 30, 1958, was 22,515,763 tons (table 1). It comprised 21,576,035 tons of products containing one or more of the primary nutrients and 939,728 tons of secondary and trace nutrient materials. Consumption of fertilizers containing primary nutrients was 189,733 tons (0.9 per cent) below that (21,765,768 tons) in 1956-57. The quantity of the secondary and trace nutrient materials was 3,515 tons (0.4 per cent) below that (943,243 tons) used in 1956-57.

The changes in consumption of the classes of fertilizers containing primary nutrients in 1957-58 as compared with 1956-57 are summarized by regions in table 2. The national decrease in total consumption in 1957-58 was due to a decrease of 349,784 tons (2.4 per cent) of mixtures, which was partly offset by an increase of 160,051 tons (2.3 per cent) of direct application materials. This was the fifth consecutive year since the peak of 1952-53 that the quantity of mixtures had decreased. The consumption of direct application materials, however, has in-



Graph by FARM CHEMICALS staff

NUTRIENT 1957-58

creased annually except in 1952-53 and 1953-54. The decrease in total consumption was chiefly in the South Atlantic and East South Central regions. The consumption in the North Central, Mountain, and Pacific regions continued to make large gains.

As shown in table 3 (column 9), consumption of fertilizers containing primary nutrients increased in 27 and decreased in 23 areas. In comparison with 1956-57, the increases ranged up to 55 per cent (District of Columbia), while the decreases ranged to 37 per cent (Hawaii). In the areas showing increases, 669,995 tons (7.7 per cent) more fertilizer were consumed, while in the areas showing decreases the consumption was 859,728 tons (6.6 per cent) lower—resulting in a net decrease of 189,733 tons (0.9 per cent). As in 1956-57, the tonnage was higher in most of the northern and western states and generally lower in the southeastern states.

Compared with the consumption in each six-month period of 1956-57, mixtures decreased by 283,543 tons (7.6 per cent) in the July-December period and by 66,241 tons (0.6 per cent) in the January-June period. Consumption of primary nutrient materials was higher by 138,249 tons (5.8 per cent) and 21,802 tons (0.5 per cent) in these periods, respectively.

MIXTURES

In 1957-58 the total consumption of commercial mixtures amounted to 14,353,023 tons (table 3). There were 1,698 grades reported. In addition, over 500 mixtures, many of which are duplicated in the above total but were not reported by grades, were used in California and an unknown number was reported as miscellaneous tonnages in other states. Mixtures consumed in 1957-58 represented 63.7 per cent of the quantity of all fertilizers compared with 64.7 per cent for the preceding year.

The total consumption of mixtures was 349,784 tons (2.4 per cent) lower than in 1956-57. In 1957-58, a cumulative increase of 213,141 tons (6.6 per cent) of mixtures was shown for 23 areas and a decrease of 562,925 tons (4.9 per cent) for 28 areas. Larger quantities were used in

TABLE 1. KINDS OF FERTILIZERS CONSUMED, year ended June 30, 1958¹

Kind	Tons										
	New England	Middle Atlantic	South Atlantic	East North Central	West North Central	East South Central	West South Central	Mountain	Pacific	Hawaii and Puerto Rico	United States
MIXTURES: N-P-K	136,487	1,622,205	4,207,963	1,045,300	995,486	1,611,294	970,866	27,021	290,215	204,828	12,941,569
N-P	26	321	156	49,705	140,017	5,459	38,037	31,534	80,158	2,112	341,595
P-K	30,395	105,594	178,045	230,440	67,161	175,452	28,817	7	2,390	1,732	821,955
N-K	0	59	202,751	529	72	3,315	0	48	24,551	31,611	247,015
CHEMICAL NITROGEN MATERIALS											
Ammonia, anhydrous	0	2,445	25,175	97,152	139,082	51,832	139,927	42,754	124,256	772	581,436
Ammonia, aqua	0	0	846	2,261	9,402	45	7,844	26,237	289,640	26,087	385,060
Ammonia nitrate/	4,780	31,815	136,369	158,098	24,044	288,477	106,142	70,272	105,154	0	1,116,900
Ammonia nitrate-limestone mixtures	106	2,195	223,844	2,653	173	30,777	339	1,602	60	0	283,511
Ammonium sulfate	531	4,459	11,673	97,108	11,771	11,562	97,778	63,170	228,008	58,655	577,111
Calcium cyanamide	11,779	9,011	8,494	1,008	189	9,467	6,467	1,171	0	0	46,348
Calcium nitrate	2	0	10,118	115	0	146	135	11,960	39,788	111	57,774
Nitrogen solutions	904	1,608	83,748	59,371	82,673	9,400	29,666	5,664	56,392	0	204,544
Sodium nitrate	1,582	10,327	241,614	1,362	286	129,968	49,157	493	366	134	435,509
Urea	1,076	3,661	3,614	11,950	3,796	1,812	18,700	19,034	27,044	8,096	98,381
Other	235	2,615	970	2,605	600	37	170	975	895	0	9,135
NATURAL ORGANIC MATERIALS											
Blood, dried	3	29	35	0	0	0	0	19	2,170	0	2,436
Custor pomace	1,519	219	2,660	0	0	85	0	0	0	0	3,600
Composts	476	305	0	7,176	4,049	0	2,342	370	1,900	0	16,838
Cottonseed meal/	6,517	183	1,500	0	0	0	0	0	0	0	8,200
Fish scrap, meal, emulsions	423	16	0	15	0	0	0	0	0	0	1,735
Manure, dried	13,732	4,215	7,804	6,283	1,137	2,619	2,100	262,786	0	302,516	302,516
Sewage sludge, activated	7,403	14,441	8,735	30,518	8,161	1,029	3,388	4,690	18,567	100	97,000
Sewage sludge, other	0	0	0	740	36	19	0	265	35,621	0	36,717
Tillage, animal	0	410	0	0	0	0	0	0	0	0	1,468
Tillage, process	1,346	7,751	3,779	397	1	0	0	0	0	10	15,304
Other	73	138	1,012	0	0	0	0	100	1,461	0	5,571
PHOSPHATE MATERIALS											
Ammonium phosphate: 11-45/	0	454	45	9,688	45,025	11	3,539	9,138	16,111	1,095	83,066
Ammonium phosphate: 13-30/	0	0	0	18,375	18,375	0	0	0	0	0	36,750
Ammonium phosphate sulfate: 16-20/	0	0	0	948	74,635	73	67,317	46,996	106,785	861	299,015
Ammonium phosphate nitrate: 27-14/	0	0	0	0	3,224	0	0	4,336	10,135	0	17,691
Ammoniated superphosphate/	0	0	37	0	0	0	0	0	0	0	3,049
Basic slag	0	0	18,900	0	0	109,000	3,322	0	0	0	144,222
Bromine: raw and steamed	1,469	4,115	1,860	1,905	24	307	365	1,908	0	0	11,009
Calcium metaphosphate:	0	290	2,478	11,617	15,122	1,936	996	972	26	0	45,700
Diammonium phosphate: 20-55/	0	113	1,961	3,756	5,585	1,166	3,027	1,071	1,071	1,107	20,698
Phosphoric acid	0	0	0	254,260	215,008	0	1,611	10,781	10,675	0	512,687
Phosphate rock	274	7,495	9,275	6,283	1,137	2,619	2,100	262,786	0	2,600	262,786
Sulphuric acid	0	80	317	1,303	1,100	9,649	2,915	120	710	0	25,252
Superphosphate:	1,884	7,751	16,496	16,078	16,363	19,240	0	0	0	0	80,296
15-15	0	0	0	0	0	0	0	0	0	0	0
20-20	0	0	0	0	0	0	0	0	0	0	0
20-25	0	0	0	0	0	0	0	0	0	0	0
20-30	0	0	0	0	0	0	0	0	0	0	0
20-35	0	0	0	0	0	0	0	0	0	0	0
20-40	0	0	0	0	0	0	0	0	0	0	0
20-45	0	0	0	0	0	0	0	0	0	0	0
20-50	0	0	0	0	0	0	0	0	0	0	0
20-55	0	0	0	0	0	0	0	0	0	0	0
20-60	0	0	0	0	0	0	0	0	0	0	0
20-65	0	0	0	0	0	0	0	0	0	0	0
20-70	0	0	0	0	0	0	0	0	0	0	0
20-75	0	0	0	0	0	0	0	0	0	0	0
20-80	0	0	0	0	0	0	0	0	0	0	0
20-85	0	0	0	0	0	0	0	0	0	0	0
20-90	0	0	0	0	0	0	0	0	0	0	0
20-95	0	0	0	0	0	0	0	0	0	0	0
20-100	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0
POTASH MATERIALS											
Cotton hull ashes	318	0	0	0	0	0	0	0	0	0	318
Lime-potash mixtures/	0	0	0	0	0	0	0	0	0	0	0
Muriate of potash	0	0	0	0	0	0	0	0	0	0	0
Potassium chloride: 50%	150	219	394	4,198	299	366	861	140	115	0	6,394
magnesium sulfate	1,678	4,625	35,252	187,179	45,095	40,996	28,344	1,432	5,884	7,887	338,395
sodium nitrate/	174	1	13,490	29	0	1,256	18	0	0	0	14,778
sulfate	114	1,313	5,046	3,480	2	6,811	120	1,125	6,864	2,106	26,787
Other	4	15	2,652	1,115	0	0	0	0	0	0	4,381
TOTAL: PRIMARY NUTRIENT FERTILIZERS	137,508	1,921,842	5,566,951	4,675,462	2,312,604	2,622,810	1,336,344	504,390	1,839,470	354,382	21,579,025
SECONDARY & TRACE NUTRIENT MATERIALS											
Aluminum sulfate/	4	8	7	0	0	0	0	0	53	0	74
Boric acid	41	165	0	193	0	0	0	0	630	0	1,024
Calcium sulfate (gypsum)	101	3,498	99,377	1,717	135	1,130	810	39,000	742,258	2	889,703
Copper sulfate/	0	64	208	33	0	1	0	0	200	0	512
Iron sulfate/	0	0	0	0	0	0	0	0	0	0	0
Magnesium sulfate/	28	230	114	33	0	0	0	0	64	0	548
Manganese sulfate/	0	136	97	430	0	0	0	0	0	0	6,002
Milled minerals/	0	19	1,097	15	266	7	102	651	3,861	0	5,582
Sulfur: 25-99%	7	30	195	1	38	0	3,081	1,585	16,409	0	21,550
Sulfuric acid: 40-95%	0	0	0	0	0	0	834	2,674	964	0	4,472
Zinc sulfate/	0	27	216	1	4	85	3	3	3,294	66	3,699
Other	0	0	31	107	0	0	0	2,330	1,230	0	5,825
SECONDARY & TRACE NUTRIENT MATERIALS	189	3,939	101,674	2,533	436	2,645	5,075	46,710	773,975	2,496	939,728
GRAND TOTAL	137,717	1,925,781	5,668,625	4,677,995	2,313,040	2,625,455	1,341,419	551,100	1,846,445	356,878	22,518,753

¹Including 1,030 tons of 30-10-0 grade, 6,100 tons of calcium metaphosphate, 4,625 tons of diammonium phosphate, and 297 tons superphosphate (48%) distributed by Government agencies for test demonstrations. Does not include liming materials or the quantities of materials used for the manufacture of the indicated quantities of commercial mixtures. The primary plant nutrient content of mixtures is shown in Table II, and of the principal materials in Table III. ²Consumption in Alaska was not available. It is estimated to be not more than 2,000 tons. Consumption in U.S. possessions considered negligible. ³Minor quantities may have been used for other purposes than fertilizer. ⁴Distributed by manufacturers of fertilizers. ⁵Including quantities reported as mixtures. ⁶Additional quantities may have been reported by grade under mixtures. ⁷Additional quantities are given free to farmers for which no records are kept.

TABLE 2.—REGIONAL CHANGE IN CONSUMPTION of fertilizers in year ended June 30, 1958, from that in the preceding year

Region	Change from previous year in consumption as					
	Mixtures Tons	Materials ¹ Tons	Total ¹ Tons	Mixtures Per cent	Materials ¹ Per cent	Total ¹ Per cent
New England . . .	3,585	-552	3,033	1.0	-0.8	0.7
Middle Atlantic . .	-17,414	4,299	-13,115	-1.0	2.2	-1.7
South Atlantic . . .	-196,487	-56,811	-253,298	-4.1	-5.6	-4.4
East North Central	8,577	114,172	122,749	.3	9.2	2.7
West North Central	-17,374	148,280	130,906	-1.4	15.4	6.0
East South Central	-116,051	-132,547	-248,598	-6.1	13.8	-8.7
West South Central	-1,047	22,111	21,064	-.2	3.2	1.6
Mountain	12,760	61,253	74,013	22.6	16.4	17.2
Pacific	27,480	73,841	101,321	7.9	5.3	5.8
Total	-295,971	234,046	-61,925	-2.0	3.4	-.3
Hawaii	-5,221	-66,675	-71,896	-8.0	-52.7	-37.5
Puerto Rico	-48,592	-7,320	-55,912	-21.1	-12.2	-19.3
United States	-349,784	160,051	-189,733	-2.4	2.3	-.9

¹Excluding the quantity of secondary and trace nutrient materials.

TABLE 3. FERTILIZERS CONSUMED AS MIXTURES AND AS SEPARATE MATERIALS, year ended June 30, 1958, compared with consumption of previous year

State and region	Mixtures ^{1/}			Materials ^{2/}			Grand total	Comparison with total consumption in year ended June 30, 1957	
	July 1 - Dec. 31, 1957	Jan. 1 - June 30, 1958	Total	July 1 - Dec. 31, 1957	Jan. 1 - June 30, 1958	Total		Fertilizer ^{3/}	N, avail. P ₂ O ₅ & K ₂ O
	Tons	Tons	Tons	Tons	Tons	Tons		Percent	Percent
Maine	11,497	159,377	170,874	4,258	3,736	7,994	178,868	104	107
New Hampshire	2,550	13,319	15,869	1,124	3,069	4,193	20,062	103	103
Vermont	5,026	35,166	40,192	12,776	4,581	17,357	57,549	104	103
Massachusetts	12,149	55,744	67,893	6,040	13,050	19,090	86,983	101	100
Rhode Island	2,144	13,065	15,209	630	1,469	2,099	17,308	102	102
Connecticut	7,727	49,114	56,841	4,227	15,879	20,106	76,947	91	96
New England	41,093	325,785	366,878	29,055	41,784	70,839	437,717	101	103
New York	120,979	430,694	551,673	27,854	56,071	83,925	635,598	110	110
New Jersey	39,288	153,349	192,637	6,979	15,961	22,940	215,577	80	82
Pennsylvania	174,512	401,807	576,319	24,093	41,907	66,000	642,319	101	102
Delaware	13,303	65,459	78,762	1,129	2,547	3,676	82,438	94	94
District of Columbia	1,128	1,879	3,007	492	502	994	4,001	155	170
Maryland	66,159	195,231	261,390	5,295	11,413	16,708	278,098	95	97
West Virginia	11,629	52,752	64,381	2,695	6,674	9,369	73,750	90	90
Middle Atlantic	426,998	1,301,171	1,728,169	68,537	135,075	203,612	1,931,781	99	100
Virginia	128,722	480,431	609,153	17,930	78,354	96,284	705,437	91	95
North Carolina	171,108	1,029,363	1,200,471	40,509	269,822	310,331	1,510,802	97	100
South Carolina	84,690	440,709	525,399	32,189	175,164	207,353	732,752	90	92
Georgia	192,037	792,594	984,631	52,111	221,559	273,670	1,258,301	97	100
Florida	513,858	782,407	1,296,265	61,414	103,556	164,970	1,461,235	99	102
South Atlantic	1,090,415	3,525,504	4,615,919	204,153	848,455	1,052,608	5,668,527	96	99
Ohio	262,952	686,660	949,612	27,931	75,059	102,990	1,052,602	102	102
Indiana	227,128	623,308	850,436	53,074	178,673	231,747	1,082,183	100	103
Illinois	144,813	409,998	554,811	43,319	467,648	510,967	1,453,778	106	110
Michigan	170,679	405,371	576,050	19,197	53,713	72,910	648,960	102	104
Wisconsin	46,663	348,322	394,985	12,638	32,849	45,487	440,472	103	106
East North Central	852,235	2,473,659	3,325,894	544,159	807,942	1,352,101	4,677,995	103	105
Minnesota	41,291	278,920	320,211	31,838	91,257	123,095	443,306	104	106
Iowa	46,323	293,274	339,597	57,337	145,158	202,495	542,092	117	118
Missouri	146,859	253,762	400,621	188,489	167,003	355,492	756,113	94	93
North Dakota	5,533	25,421	30,954	18,338	56,950	75,288	106,742	131	131
South Dakota	947	9,718	10,665	5,068	18,510	23,578	34,243	139	138
Nebraska	6,144	25,598	31,742	48,336	151,975	200,311	232,053	137	135
Kansas	40,833	28,122	68,955	75,147	53,445	128,592	197,547	93	94
West North Central	287,930	914,815	1,202,745	425,053	684,298	1,109,351	2,312,096	106	108
Kentucky	64,274	371,320	435,594	26,009	70,367	96,376	531,970	98	100
Tennessee	95,987	314,026	410,013	32,903	70,569	103,472	513,485	94	93
Alabama	130,317	562,132	692,449	62,409	192,328	254,737	947,186	91	94
Mississippi	18,011	239,473	257,484	150,597	224,133	374,730	632,214	85	84
East South Central	308,589	1,486,951	1,795,540	271,918	557,397	829,315	2,624,855	91	92
Arkansas	21,630	118,246	139,876	41,203	109,529	150,732	290,608	89	91
Louisiana	31,753	115,247	147,000	31,927	97,164	129,091	276,091	96	97
Oklahoma	24,856	33,370	58,226	26,893	21,809	48,702	106,928	99	100
Texas	83,829	202,496	286,325	130,853	250,614	381,467	667,792	112	115
West South Central	162,068	469,359	631,427	230,876	479,116	709,992	1,341,419	102	104
Montana	760	3,684	4,444	12,531	21,239	33,770	38,214	87	91
Idaho	1,291	6,910	8,201	19,804	80,028	99,832	108,033	134	133
Wyoming	192	1,178	1,370	1,344	10,160	11,504	12,874	123	119
Colorado	2,373	11,270	13,643	19,385	48,561	67,946	81,589	134	134
New Mexico	499	2,219	2,718	7,499	29,719	37,218	39,936	106	102
Arizona	9,333	23,233	32,566	63,958	112,412	176,370	208,936	112	120
Utah	990	3,374	4,364	5,034	30,351	35,385	39,709	123	129
Nevada	522	1,362	1,884	15,955	3,920	19,875	21,759	133	161
Mountain	15,920	53,230	69,150	145,510	336,390	481,900	551,050	117	120
Washington	8,405	36,720	45,125	72,690	129,924	202,614	247,739	142	148
Oregon	5,073	23,098	28,171	41,457	122,516	163,973	192,144	89	92
California	103,838	198,484	302,322	891,341	979,899	1,871,240	2,173,562	104	108
Pacific	117,316	258,302	375,618	1,005,488	1,232,339	2,237,827	2,613,445	106	111
Total	3,302,564	10,808,776	14,111,340	2,924,749	5,122,796	8,047,545	22,158,885	100	103
Hawaii	38,641	21,566	60,207	43,247	19,004	62,251	122,458	63	66
Puerto Rico	79,632	101,844	181,476	26,680	26,264	52,944	234,420	81	82
United States: 1957-58	3,420,837	10,932,186	14,353,023	2,994,676	5,168,064	8,162,740	22,515,763	99	102
1956-57	3,704,380	10,998,427	14,702,807	2,875,726	5,130,478	8,006,204	22,709,011	100	100
1955-56	3,545,913	11,229,740	14,775,653	2,508,638	4,909,679	7,418,317	22,193,970	98	95

^{1/}The classes of mixtures are listed in Table 1 and the principal grades in Tables 4 and 5. ^{2/}The kinds of materials are listed in Tables 1 and 8. Quantities include the primary nutrient (N, P₂O₅, K₂O) materials and the secondary and trace nutrient materials. ^{3/}Fertilizers which were guaranteed to contain one or more of the primary nutrients.

most of the states of the New England, West North Central, Mountain, and Pacific regions, while in the majority of the other areas their use was smaller than in the preceding year.

N-P-K mixtures (table 1) represented 90.2 per cent of the total tonnage of mixtures, while the other types (N-P, P-K, N-K) accounted for 2.4 per cent, 5.7 per cent, and 1.7 per cent, respectively. The N-P-K type comprised more than 80 per cent of the tonnage of mixtures in all

regions except the Mountain and Pacific. In these regions, N-P-K mixtures represented 53.5 per cent and 77.3 per cent, respectively, while the N-P type represented 45.6 per cent and 21.3 per cent, respectively.

Excluding Hawaii and Puerto Rico, 108 grades of mixtures were each used in quantities of 10,000 tons or more. Only 107 of these are listed in table 4 as one grade was restricted. The 108 grades totaled 12,911,855 tons and accounted for 91.50

per cent of the quantity of mixtures used in the designated areas. Other grades consumed in the same areas in individual amounts of 2,500 to 9,999 tons totaled 118 (625,380 tons, 4.43 per cent), while those under 2,500 tons totaled 1,359 (204,304 tons, 1.44 per cent). The balance (369,801 tons, 2.63 per cent) represented mixtures not reported by grades.

Consumption of mixtures in Hawaii and

Puerto Rico amounted to 241,683 tons in 145 grades. While many of the grades in Puerto Rico are similar to those used in other areas of the United States, most of those in Hawaii are designated in fractional numbers.

The 15 grades consumed in largest tonnages in 1957-58 in each of the regions are shown in table 5, together with the quantities for each state in the region. At least 11 of the grades in each area were among the 15 consumed in largest tonnages in the preceding year, but not always in the same relative order of tonnage. The principal grades in 1957-58 accounted for 50 per cent or more of the total quantity of mixtures consumed in each of the states except California, Colorado, Florida, Kansas, Nebraska, North Dakota, Oregon, South Dakota, Washington, and Wyoming. In each of these states, except North Dakota, they represented 30 to 49 per cent of the total.

The total tonnage of the 15 grades shown for the United States, excluding Hawaii and Puerto Rico, represented 61.3 per cent of the tonnage of all mixtures. Nearly two-thirds of the tonnage was supplied by approximately one per cent of the grades. As in the preceding year, the 5-10-10 grade was consumed in largest tonnage. The relative order of most of the other 14 grades was the same in 1957-58 as in 1956-57, except that the 3-9-6 grade was replaced by the 5-10-15 grade and the relative order of the 5-20-20 and 3-12-12 grades and of the 4-10-7 and 2-12-12 grades were reversed.

The 5-10-10 and 4-12-12 grades, consumed in the largest tonnages for the individual grades have nutrient ratios of 1:2:2 and 1:3:3. Mixtures having these ratios were also used in the largest total tonnages in 1957-58 (table 6). The cumulative tonnages of all grades reported in the 10 listed ratios accounted for 74.1 per cent of the total use of mixtures in the United States (excluding Hawaii and Puerto Rico) in 1957-58.

The national weighted average of the primary nutrients contained in mixtures in 1957-58 was 5.96 per cent N, 12.53 per cent available P_2O_5 , and 11.73 per cent K_2O , a total of 30.22 per cent (table 7). The corresponding values in the preceding year were 5.74, 12.36, 11.43 (revised), and 29.53 (revised) per cent. The proportionate increase was highest for N (3.83 per cent), while that for available P_2O_5 was only 1.38 per cent, and for K_2O 2.62 per cent.

Compared with 1956-57, the average nitrogen content of all mixtures increased in each of 46 areas and decreased in 5. Available P_2O_5 increased or did not change in 32 areas and decreased in 19, while K_2O increased in 29 areas and decreased in 22. In 1957-58, the change to higher concentrations of primary nutrients in mixtures was largest for nitrogen in Hawaii and the New England and West North Central regions and smallest in the Mountain and East South Central regions. For available P_2O_5 the change was largest in Hawaii, Puerto Rico, and the Pacific region, and smallest in the South Atlantic and East South Central regions. For K_2O the change was largest in the Mountain and Pacific regions, and smallest in the New England and East North Central regions. The only regions in which the average concentrations of pri-

mary nutrients were below that of the preceding year were the West North Central (revised average, 18.76 per cent) and West South Central for available P_2O_5 and in the West North Central for K_2O . The concentration of P_2O_5 was also lower in Hawaii and Puerto Rico.

MATERIALS

In 1957-58, the total consumption of materials for direct application, including secondary and trace nutrient materials, amounted to 8,162,740 tons—36.3 per cent of all fertilizers used, compared with 35.3 per cent for the preceding year. The quantity of these materials was 156,536 tons (2.0 per cent) more than that (8,006,204 tons) in 1956-57. The tonnages of the principal grades and products in 1957-58 are shown in tables 1 and 8, and the changes from the preceding year are summarized in table 9.

Compared with the previous year, the chemical nitrogen materials and the natural organic materials were consumed

in larger amounts, while the use of phosphate, potash, and secondary and trace nutrient materials decreased. The changes in consumption of chemical nitrogen, natural organic, and phosphate materials followed the general patterns of the past 5 years. The decreased consumption of potash materials was a reversal of the pattern.

The increase in the consumption of chemical nitrogen materials was due largely to greater use of anhydrous ammonia, nitrogen solutions, and ammonium sulfate. The larger tonnages of these materials together with increases in ammonium nitrate and other chemical nitrogen products, more than offset the decreased tonnages of ammonium nitrate-limestone mixtures, sodium nitrate, and urea. Compared with 1956-57, the changes in the areal use of anhydrous ammonia ranged from a decrease of 14.6 per cent in Puerto Rico to an increase of 65.4 per cent in the East North Central region. The percentage increases in this region, the

TABLE 4. PRINCIPAL GRADES OF MIXTURES consumed in the U. S., year ended June 30, 1958, compared with consumption of previous year

Grade	Consumption ^{1/}		Proportion of total		Grade	Consumption ^{1/}		Proportion of total	
	1957	1958	1957	1958		1957	1958	1957	1958
	Tons	Tons	Percent	Percent		Tons	Tons	Percent	Percent
0-9-27	13,848	12,853	0.10	0.09	6-8-8	278,438	239,274	1.94	1.69
0-10-20	77,023	76,963	.54	.54	6-8-12	16,797	14,516	.11	.11
0-10-30	47,908	51,339	.33	.37	6-9-12	24,767	23,908	.17	.15
0-12-12	13,573	11,431	.10	.08	6-10-4	89,016	76,780	.62	.55
0-12-36	10,546	13,557	.07	.09	6-12-6	34,330	35,630	.24	.25
0-14-14	162,169	186,776	1.12	1.33	6-12-12	371,569	389,039	2.57	2.76
0-15-30	20,002	24,228	.14	.17	6-18-6	14,414	25,361	.10	.18
0-20-20	304,514	285,711	2.12	2.02	6-24-12	105,127	144,589	.73	1.03
0-24-24	9,331	10,764	.06	.08	6-24-24	63,358	107,939	.44	.76
0-25-25	27,032	30,247	.19	.21	7-7-7	24,417	19,617	.17	.14
0-30-15	13,561	10,835	.09	.08	7-8-8	8,672	10,569	.06	.07
0-30-30	15,879	14,440	.11	.10	7-28-14	14,204	26,933	.10	.20
2-12-12	371,393	302,441	2.57	2.15	8-0-8	11,022	12,017	.08	.08
3-9-6	251,084	40,138	1.74	.34	8-0-24	17,869	20,463	.13	.15
3-9-9	508,959	500,107	3.67	3.54	8-4-8	41,763	53,300	.29	.37
3-9-12	26,998	28,229	.19	.20	8-4-12	6,990	13,314	.05	.10
3-9-18	61,932	63,982	.43	.45	8-8-4	15,536	11,706	.10	.08
3-9-27	75,262	67,528	.52	.48	8-8-8	221,474	205,192	1.54	1.46
3-12-6	106,552	89,117	.75	.63	8-12-12	59,701	68,877	.42	.48
3-12-12	908,575	708,604	6.31	5.03	8-16-16	166,068	191,186	1.16	1.36
3-18-9	36,428	29,246	.25	.20	8-24-0	10,280	21,890	.07	.15
3-18-18	0	14,551	0	.11	8-24-4	62,403	45,615	.43	.33
4-6-6	10,635	10,437	.07	.07	8-24-12	18,643	23,877	.13	.17
4-6-8	43,788	28,720	.31	.20	8-32-0	56,349	52,210	.39	.37
4-7-5	118,792	114,495	.82	.81	9-6-6	14,459	13,892	.10	.09
4-8-4	12,340	14,698	.09	.11	9-9-9	16,605	33,634	.12	.24
4-8-6	143,180	82,839	.99	.59	9-12-12	11,644	13,870	.08	.10
4-8-8	208,791	137,019	1.45	.97	10-0-10	21,182	17,547	.14	.12
4-8-10	67,176	84,934	.60	.60	10-6-4	59,507	78,079	.41	.56
4-8-12	74,057	113,281	.52	.80	10-10-5	26,279	23,061	.18	.16
4-9-3	52,208	49,990	.36	.36	10-10-10	689,131	701,570	4.79	4.90
4-10-6	105,996	86,319	.74	.61	10-20-0	53,834	47,466	.38	.33
4-10-12	362,433	306,541	2.52	2.17	10-20-5	5,451	11,912	.03	.09
4-10-10	17,075	21,440	.12	.15	10-20-10	140,494	165,234	.98	1.17
4-12-4	61,625	41,225	.43	.29	10-20-20	29,195	45,248	.20	.32
4-12-8	148,832	123,724	1.03	.88	12-0-10	16,846	16,385	.12	.11
4-12-12	949,433	1,021,630	6.59	7.24	12-0-12	7,711	11,219	.05	.08
4-16-8	22,371	26,168	.16	.19	12-6-6	13,164	23,024	.09	.17
4-16-16	507,812	469,477	3.66	3.32	12-12-12	611,110	690,322	4.24	4.89
5-6-8	10,264	12,472	.07	.09	12-24-12	29,958	25,366	.21	.18
5-7-5	22,311	19,751	.15	.14	13-13-13	44,801	47,658	.31	.34
5-10-5	604,630	535,745	4.19	3.80	14-0-14	34,770	53,046	.24	.37
5-10-10	1,407,706	1,479,466	9.78	10.48	14-14-14	45,114	43,390	.31	.31
5-10-15	150,218	206,112	1.04	1.46	15-0-15	9,756	11,492	.07	.08
5-10-30	4,109	10,080	.02	.07	15-5-5	2,186	12,786	.01	.09
5-20-10	73,446	85,592	.51	.60	15-10-10	4,953	12,089	.03	.09
5-20-20	787,384	818,501	5.46	5.81	15-15-0	19,351	20,709	.13	.14
6-4-6	20,022	17,362	.14	.12	15-15-15	27,695	29,953	.20	.22
6-4-8	39,255	24,272	.41	.39	16-8-8	6,287	10,983	.04	.07
6-6-6	95,018	92,844	.66	.66	16-4-0	15,342	19,571	.11	.14
6-6-8	37,781	37,136	.27	.26	17-7-0	21,061	14,541	.14	.11
6-6-12	12,033	21,233	.08	.15	20-0-20	9,729	10,275	.06	.07
6-6-18	9,832	13,443	.07	.10	20-20-0	7,003	12,264	.05	.09
6-8-6	130,846	115,721	.91	.82					
Grades of 10,000 tons or more					8/ 13,306,316	3/ 12,905,359	98.35	91.45	
Grades of 5,000 to 9,999 tons					4/ 356,835	2/ 415,938	2.48	2.95	
Grades of 2,500 to 4,999 tons					2/ 207,242	5/ 215,938	1.44	1.53	
Grades under 2,500 tons					7/ 218,949	8/ 204,304	1.52	1.44	
Not reported by grade					317,969	369,801	2.21	2.63	
Total 9/					10/ 14,407,311	11/ 14,111,340	100.00	100.00	

^{1/} Grades consumed in amounts of 10,000 tons or more in year ended June 30, 1958 and their consumption in year ended June 30, 1957. ^{2/} 104 grades. ^{3/} 108 grades. ^{4/} 49 grades. ^{5/} 62 grades. ^{6/} 62 grades. ^{7/} 1,301 grades. ^{8/} 1,617 grades. ^{9/} Does not include the quantity of mixtures consumed in Alaska, Hawaii, or Puerto Rico. ^{10/} 1,520 grades. ^{11/} 2,043 grades.

Corrections: In Consumption: 1958 and Proportion of total: 1958 columns, respectively, 12-24-12 grade should read 31,862 tons, 22 per cent; Grades of 10,000 tons or more should read 12,911,855 tons, 91.50 per cent. and Grades of 5,000 to 9,999 tons should read 409,442 tons, 2.90 per cent. Footnote 8 should read 1,359 grades; footnote 11 should read 1,585 grades.

TABLE 5. MIXTURES CONSUMED IN STATES AND REGIONS
by grade, year ended June 30, 1958

State	Consumption of 15 principal grades in indicated region															Other grades		Total tons
	Tons															No. 1/	Tons 2/	
New England																		
	8-12-12	10-10-10	5-10-10	8-16-16	6-9-12	0-20-20	0-15-30	8-9-10	5-8-7	6-3-6	7-7-7	5-10-5	8-12-16	6-10-4	11-12-14			
Maine	58,136	24,606	8,118	14,836	21,655	3,334	332	9,470	1,740	0	0	310	370	6,117	182	5,684	42	
New Hampshire	1,059	3,006	2,290	5,378	0	806	1,338	0	630	0	0	535	211	0	249	0	28	
Vermont	555	8,495	5,590	7,719	0	12,900	2,963	0	42	0	0	261	72	75	27	0	26	
Massachusetts	1,329	12,647	15,174	5,993	15	394	1,501	0	3,543	1,093	3,140	2,515	0	3,186	0	29	17,353	
Rhode Island	884	1,361	7,097	313	0	533	388	0	462	0	0	470	315	0	132	0	25	
Connecticut	1,279	11,086	10,010	6,751	0	1,473	1,469	0	1,580	5,609	1,883	2,753	0	1,920	0	68	12,844	
Total	63,242	61,401	40,633	36,900	21,870	18,580	10,131	9,470	7,997	6,702	6,599	6,236	6,132	5,696	5,684	101	31,465	
Middle Atlantic																		
	5-10-10	5-10-5	10-10-10	8-16-16	3-12-6	0-20-20	6-12-12	6-12-6	10-6-4	3-12-12	2-12-12	4-8-12	10-20-20	5-10-15	4-12-12			
New York	143,756	109,569	79,751	63,979	1,959	17,313	15,134	26,091	16,215	2,385	2	1,557	7,737	9,327	186	90	63,932	
New Jersey	99,781	21,961	8,435	1,845	629	2,395	4,104	1,640	4,112	1,032	130	401	5,528	861	53	67	39,730	
Pennsylvania	267,205	20,009	60,173	35,997	41,845	10,097	1,128	3,613	11,913	6,050	7,111	6,411	1,899	13,476	11,362	25	54,747	
Delaware	36,762	1,188	8,063	3,355	432	1,667	2,869	0	218	0	0	4,334	877	556	6,674	1,362	66	
Dist. of Col.	76	1,428	12	0	1	0	0	641	2	0	0	6	0	0	0	0	25	
Maryland	97,369	25,070	22,484	7,181	21,451	6,376	2,825	3,358	9,430	12,703	13,500	2,527	1,607	4,133	91	31	61,665	
West Virginia	31,134	2,440	1,522	338	6,510	5,005	371	5	531	347	2,617	27	430	172	50	55	11,042	
Total	676,053	181,665	175,440	112,655	72,237	67,442	35,600	28,667	28,388	26,070	25,860	23,487	23,289	20,540	19,300	196	211,276	
South Atlantic																		
	4-12-12	5-10-10	3-9-9	2-12-12	4-8-8	4-7-5	5-10-5	8-8-8	6-6-6	6-8-6	4-8-12	4-10-6	4-8-10	4-8-6	10-10-10			
Virginia	12,838	157,838	45,350	126,659	0	0	66,298	6,692	0	12,191	0	0	7,148	0	40,722	28	137,417	
North Carolina	23,666	367,273	273,363	129,778	0	0	312	33,397	0	49,660	94,010	255	56,120	0	14,906	18	179,771	
South Carolina	95,006	27,457	129,099	0	0	0	33,946	6,669	0	3,913	33,816	85,917	0	0	1,569	29	107,543	
Georgia	633,008	6,428	46,970	11,848	36,237	0	1,640	5,352	94	19,637	0	28	0	0	52,203	793	114,840	
Florida	46,229	3,631	6,170	4,822	73,884	114,495	2,383	46,778	21,205	4,471	1,560	105	21,477	30,287	8,243	1,366	84,263	
Total	810,763	583,025	496,914	273,107	130,145	114,495	102,179	94,888	91,999	89,892	89,386	86,305	84,745	82,790	66,493	1,387	1,416,795	
East South Central																		
	5-20-20	3-12-12	4-16-16	12-12-12	10-10-10	0-20-20	5-10-10	6-24-12	6-24-24	3-9-27	0-10-30	10-6-4	5-20-10	12-12-12	3-18-9			
Ohio	100,740	287,905	53,393	99,674	64,478	28,857	116,345	28,557	4,765	810	1,033	14,557	4,739	14,030	15,976	107	113,753	
Indiana	192,311	71,373	182,032	132,876	51,514	38,074	2,970	11,999	19,397	15,967	11,269	2,697	1,351	4,561	3,174	141	108,692	
Illinois	58,693	46,344	81,306	57,793	80,188	20,565	478	5,072	17,550	18,372	3,359	2,966	4,232	2,878	362	143	154,262	
Michigan	124,093	54,205	88,544	86,165	25,637	10,487	2,493	20,358	2,225	2,636	2,976	14,823	19,535	6,459	8,707	102	55,796	
Wisconsin	112,023	36,338	71,633	8,203	36,419	30,300	445	1,365	26,131	16,824	30,328	761	272	1,015	81	97	182,385	
Total	588,060	536,865	442,908	384,711	256,236	128,283	122,831	77,360	70,129	54,609	48,945	35,804	30,620	29,615	29,234	276	489,684	
West North Central																		
	12-12-12	5-20-20	6-24-12	10-10-10	5-20-10	8-24-8	3-12-12	0-20-20	10-20-0	8-24-12	8-32-0	4-16-16	8-8-8	6-24-24	4-12-4			
Minnesota	7,844	85,651	59,323	10,099	5,535	0	782	13,475	2,411	21,947	3,894	10,080	70	6,479	2	112	92,809	
Iowa	29,386	96,072	5,065	35,321	45,204	398	7,415	9,634	11,813	283	10,370	5,765	26	9,815	17	223	81,003	
Missouri	184,840	13,030	64	12,892	564	25,154	25,724	10,370	297	0	91	3,965	17,272	4,792	14,944	64	87,062	
North Dakota	737	617	1,641	52	0	0	40	32	153	1,387	444	83	0	114	0	58	25,614	
South Dakota	117	18	347	150	2	11	0	8	1,807	58	2,607	0	0	0	0	48	5,940	
Nebraska	879	415	126	77	1,667	457	0	377	3,698	0	3,849	0	4	88	13	104	20,192	
Kansas	3,249	292	0	1,533	0	13,513	323	416	2,062	0	1,129	3	204	54	2,002	58	37,175	
Total	223,032	196,135	66,566	60,124	52,942	39,533	34,254	34,112	29,201	23,675	22,424	19,896	17,576	17,342	16,578	302	349,351	
East South Central																		
	6-12-12	4-10-7	4-12-12	6-8-8	5-10-15	0-14-14	4-12-8	5-10-5	10-10-10	3-9-6	3-12-12	5-10-10	8-8-8	6-8-6	0-20-20			
Kentucky	28,414	0	745	0	103,276	497	85,286	2,346	36,758	10,373	32,176	14,995	413	21,910	8,162	113	90,243	
Tennessee	255,005	313	1,058	1,607	20,970	281	5,982	3,643	4,204	35,700	6,278	10,147	1,567	439	4,345	99	57,653	
Alabama	37	266,010	185,891	61,569	0	116,029	0	616	5,495	0	0	299	17,012	179	5,832	59	33,520	
Mississippi	3,204	6,246	1,850	115,021	0	2,720	0	71,048	26	0	3,32	9,355	6,708	0	4,166	44	27,044	
Total	287,461	272,869	189,544	178,227	124,246	119,597	91,268	77,653	46,481	46,093	38,886	34,756	25,696	22,528	22,505	175	217,730	
West South Central																		
	5-10-5	5-10-10	12-12-12	8-8-8	12-24-12	6-24-24	13-13-13	3-12-12	5-20-20	6-8-12	10-20-0	6-8-8	0-20-20	5-10-10	4-12-4			
Arkansas	30,375	22,976	12,982	1,567	446	2,490	4,766	611	1,630	13,287	52	42	7,257	2,328	123	55	38,944	
Louisiana	19,836	4,292	22,722	28,888	1,576	10,171	4,778	13,176	8,325	36	0	11,210	2,848	2,706	73	11	141,002	
Oklahoma	16,144	18,280	544	138	1,790	763	253	310	0	5,439	0	89	765	649	60	122,200	58,226	
Texas	81,656	88,221	6,361	11,522	18,268	1,800	4,242	522	2,273	1	6,903	118	74	3,114	994	125	27,266	
Total	148,023	135,399	42,709	40,245	22,780	15,224	14,727	14,541	13,638	13,324	12,394	11,370	9,668	8,913	8,022	180	120,450	
Mountain																		
	20-20-0	10-20-5	10-20-0	6-10-4	24-20-0	20-10-0	10-20-10	10-18-5	10-10-10	16-16-8	10-10-0	10-16-8	15-20-0	8-24-0	20-20-10			
Montana	1,060	0	1,321	166	239	298	13	281	0	136	0	0	0	67	0	17	835	
Idaho	1,497	1	482	201	3,260	205	0	356	0	147	25	264	0	405	0	42	1,598	
Wyoming	63	0	199	29	0	47	26	30	0	48	0	0	0	0	21	922	1,370	
Colorado	420	0	392	986	0	184	0	1,160	309	471	0	1,107	0	1,040	65	7	7,411	
New Mexico	177	91	137	5	0	106	0	40	108	79	0	0	344	0	37	1	1,232	
Arizona	4,873	6,371	2,711	238	61	2,148	1,768	0	1,236	322	1,394	0	1,234	327	0	63	9,883	
Utah	34,796	0	106	2,469	41	42	0	87	0	269	0	0	0	0	0	36	4,564	
Nevada	152	0	293	292	0	136	0	0	26	72	0	0	0	0	0	25	760	
Total	8,781	6,465	5,311	4,489	3,621	3,080	2,076	1,914	1,679	1,580	1,498	1,371	1,234	1,149	1,040	166	23,862	
Pacific																		
	10-10-10	10-10-5	7-7-7	6-10-4	8-8-8	15-8-8	4-8-2	8-24-0	10-20-10	14-14-7	8-10-12	6-20-20	5-3-2	4-10-10	5-10-10			
Washington	730	119	0	2,697	0	0	0	4,618	3,638	0	0	2,297	2,268	0	3,136	125	25,612	
Oregon	481	0	0	2,401	0	0	0	1,214	1,595	0	0	2,860	1,664	0	683	74	17,873	
California	28,772	18,821	18,384	5,286	9,774	8,389	6,852	129	10	5,034	5,001	0	0	3,824	0	3	126,697	
Total	29,610	18,942	18,384	10,614	9,774	8,389	6,852	5,961	5,243	5,034	5,001	4,647	3,932	3,854	3,819	140	240,152	
Other 2/																		
	14-4-10	15-4-7	14-8-8	12-10-8	8-6-10	6-8-10	10-6-20	13-13-12	12-13-16	12-4-10	12-6-10	12-10-5	9-10-5	12-6-8	16-4-5			
Puerto Rico	46,937	17,212	15,134	12,432	11,277	9,973	8,812	6,296	6,151	5,596	5,577	4,715	4,417	3,388	3,226	27	20,333	
United States 3/																		
	5-10-10	4-12-12	5-20-20	3-12-12	10-10-10	12-12-12	5-10-5	3-9-9	4-16-16	6-12-12	4-10-7	2-12-12	0-20-20	6-8-8	5-10-15			
New England	40,633	0	0	67	61,401	5,383	6,236	0	0									

West North Central (43.5 per cent), West South Central (32.2 per cent), and Mountain (30.4 per cent) regions were all above the national increase of 28.9 per cent. The total consumption of nitrogen solutions and aqua ammonia was 9.9 per cent higher in 1957-58; the increase was only 4.4 per cent in the Pacific region, the area of greatest use, but more than 50 per cent in the New England, East North Central, West North Central, and West South Central regions. On the other hand, the use of such materials decreased greatly in Hawaii, owing to labor troubles on the sugar plantations.

The change in consumption of ammonium sulfate ranged from a decrease of 34.2 per cent in Hawaii to an increase of 111.8 per cent in the East South Central region; total use was 11.8 per cent higher than for the preceding year. While these extremes were in areas using relatively small tonnages, the regions of principal consumption showed increases of 5.4 (East North Central), 8.8 (Pacific), 12.4 (Mountain), and 29.2 per cent (West South Central). The total uses of ammonium nitrate-limestone mixtures and sodium nitrate decreased 12.3 per cent and 11.7 per cent, respectively, in 1957-58. These decreases were mostly in the South Atlantic and East South Central regions, the areas of principal use, in which the total tonnages of fertilizers have generally decreased over the past several years. The use of urea decreased 9.7 per cent and was generally lower in most of the tabulated areas.

Consumption of the principal natural organic products (composts, dried manures, sewage sludges) was only a little higher in 1957-58, while the use of most of the other products in this category was generally lower than in the preceding year.

The total consumption of phosphate materials decreased 12,118 tons (0.5 per cent) from that in 1956-57. The principal change was in the use of colloidal phosphate and phosphate rock, an increase of 15,362 tons (1.8 per cent). The use of superphosphates (22 per cent grades and under) decreased 82,108 tons (14.7 per cent); the consumption in each of 41 areas was lower than in 1956-57. Although the use of grades of superphosphate containing over 22 per cent P_2O_5 was lower in 27 areas, the increases in the other areas were sufficient to give a slightly higher net total (394 tons, 0.1 per cent).

Among the other phosphate materials, the 11-48, 16-20, 27-14, and 21-53 grades of ammoniated phosphates (table 10) were the principal products consumed in increased amounts. The tonnages of these materials were notably higher in most states of the West North Central, West South Central, Mountain, and Pacific regions, where they are principally used. The total use of the 13-39 grade was 180 tons (0.4 per cent) lower than in 1956-57; although there were increases in many areas, the decreased use in most of the West South Central states resulted in a slightly lower total use. The consumption of basic slag, which finds its greatest use in the South Atlantic and East South Central regions, was lower by 18,440 tons (11.3 per cent).

Total consumption of potash materials in 1957-58 was lower than in 1956-57 by

TABLE 6.—RATIOS OF PRIMARY NUTRIENTS OF MIXTURES consumed in largest tonnage in United States, year ended June 30, 1958, compared with consumption of previous year.¹

Nutrient ratio ²	Consumption		Proportion of quantity of all mixtures ¹	
	1957 Tons	1958 Tons	1957 Per cent	1958 Per cent
1:2:2	2,185,187	2,245,038	15.2	15.9
1:4:4	2,287,069	2,104,639	15.8	14.9
1:1:1	1,783,217	1,868,314	12.4	13.2
1:3:3	1,490,491	1,535,657	10.3	10.9
1:2:1	836,800	800,611	5.8	5.7
0:1:1	542,682	546,498	3.8	3.9
1:4:2	326,880	381,942	2.3	2.7
1:2:3	233,578	331,163	1.6	2.4
1:6:6	371,395	316,992	2.6	2.3
4:10:7	362,853	306,711	2.5	2.2
Total	10,420,152	10,437,565	72.3	74.1

¹Excluding Alaska, Hawaii, and Puerto Rico.

²N: available P_2O_5 : K_2O .

12,361 tons (2.7 per cent). This is the first time in many years that the total tonnage of these products has not shown an annual increase. The use of the 50-62 per cent grades of potassium chloride, which comprised 81.3 per cent of the total consumption of potash materials, de-

creased 11,379 tons (3.0 per cent). The decreases were principally in the East South Central, West South Central, and South Atlantic regions and in Hawaii. Consumption increased in four regions, and there was only a slight change elsewhere. The use of lime-potash mixtures

TABLE 7.—PRIMARY PLANT NUTRIENT CONTENT of mixtures and of materials, as a weighted average, year ended June 30, 1958¹

State and region	Percent				Materials				Total in mixtures and materials	
	Mixtures ^{2/}			Total	Single nutrient ^{3/}					
	N	Available P ₂ O ₅	K ₂ O		N	Available P ₂ O ₅	K ₂ O	Multiple nutrient ^{2/}		Total nutrients
Maine	8.16	11.98	12.86	33.02	29.76	20.60	51.31	9.55	22.26	32.54
New Hampshire	6.88	12.90	13.92	33.70	28.50	20.37	55.19	10.87	22.17	31.29
Vermont	4.80	15.32	16.44	36.56	33.64	19.93	56.55	11.05	21.59	32.05
Massachusetts	7.26	10.65	9.89	27.80	17.30	19.35	59.55	11.16	15.68	25.14
Rhode Island	6.29	10.45	10.39	27.13	20.17	16.78	58.98	9.43	14.83	24.93
Connecticut	6.74	10.32	10.72	27.78	27.22	21.94	59.44	12.72	19.16	25.53
New England	7.27	11.82	12.32	31.41	23.27	20.33	57.85	11.69	19.22	29.44
New York	6.60	12.04	10.36	29.00	27.90	20.37	52.10	10.16	22.85	28.99
New Jersey	5.71	10.92	10.61	27.24	24.75	19.07	43.18	13.06	21.00	26.19
Pennsylvania	5.33	12.43	11.68	29.44	29.97	20.08	52.49	13.15	23.29	28.43
Delaware	5.25	11.55	12.32	29.12	30.75	18.10	56.82	10.78	28.55	29.55
District of Columbia	7.42	9.44	5.35	22.21	18.33	20.60	60.75	9.62	10.87	19.39
Maryland	4.85	11.26	10.45	26.56	30.31	17.63	51.86	11.93	25.55	26.50
West Virginia	4.59	12.24	10.63	27.46	23.72	22.28	59.16	9.11	22.72	26.86
Middle Atlantic	5.68	11.91	10.93	28.52	28.22	20.15	51.21	11.74	23.03	27.95
Virginia	4.33	11.24	11.37	26.94	23.79	24.11	17.30	40.71	23.05	26.47
North Carolina	4.51	9.47	10.58	24.56	24.65	18.87	36.38	15.66	25.05	24.65
South Carolina	4.13	10.07	10.20	24.40	21.03	15.23	59.18	14.92	23.55	24.17
Georgia	4.43	10.76	11.46	26.65	28.24	14.45	57.45	20.15	27.45	26.81
Florida	6.00	6.75	9.01	21.76	23.43	15.77	50.86	18.77	22.03	24.84
South Atlantic	4.84	9.29	10.39	24.52	24.56	16.69	40.51	20.00	24.64	24.84
Ohio	5.65	14.45	13.28	33.38	33.11	21.80	57.45	22.73	30.86	33.13
Indiana	6.11	16.90	15.88	38.89	39.65	21.92	59.64	44.86	42.82	39.79
Illinois	6.70	15.20	14.36	36.34	35.33	8.18	61.77	24.22	19.26	25.78
Michigan	5.98	16.08	15.06	37.12	37.87	19.87	53.09	14.82	30.66	36.41
Wisconsin	4.43	16.32	20.28	41.03	49.01	27.70	57.53	12.01	39.73	40.50
East North Central	5.87	15.71	15.26	36.84	37.14	10.00	60.16	21.97	25.48	33.96
Minnesota	6.01	21.64	14.88	42.53	44.15	43.18	60.50	46.03	49.93	44.59
Iowa	6.08	18.71	12.84	38.43	43.19	32.30	59.88	34.86	39.79	38.79
Missouri	9.57	14.18	12.36	36.11	41.14	6.13	60.80	22.95	20.18	28.63
North Dakota	13.06	28.45	5.46	46.91	43.26	45.91	60.51	49.44	48.24	48.24
South Dakota	13.28	22.91	1.35	37.54	41.00	45.43	59.09	43.08	41.26	41.26
Nebraska	10.77	22.86	4.09	37.82	53.07	42.94	44.26	47.19	51.67	49.78
Kansas	11.31	24.01	5.00	40.32	40.42	43.52	60.40	41.02	41.87	41.07
West North Central	8.12	18.69	12.25	39.06	47.26	20.94	60.26	43.48	37.54	38.33
Kentucky	5.22	11.94	12.23	29.39	35.63	22.46	53.83	38.91	33.03	30.05
Tennessee	5.56	11.88	11.35	28.79	31.85	30.03	40.56	43.29	33.37	29.70
Alabama	3.62	11.21	10.37	25.20	25.80	13.46	59.47	48.70	24.18	24.92
Mississippi	6.08	9.99	8.20	24.17	27.22	12.32	59.87	43.44	30.89	28.85
East South Central	4.80	11.32	10.71	26.88	32.88	15.72	51.97	44.28	29.40	27.68
Arkansas	6.59	14.84	13.61	35.04	38.27	37.65	60.18	38.10	41.85	38.57
Louisiana	7.03	13.63	12.51	32.21	40.60	16.38	54.80	33.69	37.73	34.79
Oklahoma	8.15	18.20	7.37	33.72	37.83	26.23	55.82	39.23	31.62	31.62
Texas	8.53	16.19	8.01	32.73	48.75	27.13	46.93	38.51	42.55	38.31
West South Central	7.72	15.48	10.01	33.21	44.05	26.72	58.05	38.39	40.76	37.19
Montana	13.95	20.97	1.35	36.27	42.94	44.56	58.18	47.21	44.72	43.72
Idaho	18.10	19.70	2.41	40.21	31.78	43.73	61.79	39.02	35.92	36.26
Wyoming	13.65	20.95	2.04	36.64	42.16	44.47	60.50	69.49	45.54	45.54
Colorado	12.76	19.28	8.07	40.11	39.99	47.29	57.78	53.80	43.86	43.21
New Mexico	12.25	20.75	4.38	37.38	46.66	36.38	48.99	58.62	41.14	40.89
Arizona	13.46	18.22	3.89	35.57	37.30	36.59	54.02	39.55	37.75	37.37
Utah	8.60	14.52	4.72	27.84	34.04	40.86	60.67	44.59	37.94	37.94
Nevada	12.37	12.74	3.18	28.29	31.41	45.02	57.76	33.67	35.24	33.18
Mountain	13.53	18.56	4.39	36.48	37.00	42.10	57.43	41.98	39.29	38.90
Washington	9.46	14.75	8.94	33.15	39.27	33.97	55.74	35.23	38.58	37.96
Oregon	9.99	16.32	8.67	34.98	38.83	23.28	59.58	37.79	30.41	31.13
California	10.22	11.42	6.57	28.21	29.05	20.26	58.02	12.83	21.92	25.01
Pacific	10.74	12.24	7.01	29.99	31.64	28.44	55.33	15.65	26.53	27.48
Average for 48 States & D. C.	5.85	12.65	11.72	30.22	34.69	17.94	55.60	25.38	30.15	30.20
Hawaii	12.55	5.66	18.31	36.72	25.58	19.79	58.88	62.19	31.69	34.22
Puerto Rico	11.96	5.44	27.66	45.06	28.23	22.31	53.13	75.60	22.44	26.48
United States: 1957-58	5.96	12.53	11.73	30.22	34.43	17.95	55.67	25.43	30.11	30.18
1956-57	5.74	12.36	11.43	29.53	33.62	17.92	55.20	24.14	28.81	29.30
1955-56	5.39	12.08	11.20	28.67	32.36	16.55	55.64	22.71	27.44	28.29

^{1/} Excluding fertilizers not guaranteed to contain one or more of the primary plant nutrients, N, P_2O_5 , or K_2O .

^{2/} Guaranteed to contain two or more of the primary plant nutrients. ^{3/} Guaranteed to contain one of the primary plant nutrients.

^{4/} Including 2 percent of the colloidal phosphate and 3 percent of the phosphate rock marketed for direct application. ^{5/} Revised.

Correction: 1956-57—Materials: Single nutrient: N reads 33.62. Should read 32.62.

TABLE 8. MATERIALS FOR DIRECT APPLICATION CONSUMED, by class and by product, year ended June 30, 1958¹

State and region	Type													Phosphate materials ^{4/}										Potash materials		Total																																																																																																																																																																																																																																																																																																								
	Chemical nitrogen materials										Natural organic ^{3/}	Phosphate rock ^{5/}			Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}		Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/}	Other ^{6/} </

^{1/} Excluding lime and the quantities used for manufacture of commercial airways. ^{2/} The principal kinds are shown separately in table 1, by regions. ^{3/} Including colloidal phosphate, the quantity of which is shown separately in table 1, by regions. ^{4/} Including an estimated 500,000 tons of dried manure.

TABLE 9.—CONSUMPTION OF CLASSES OF MATERIALS in United States, years ended June 30, 1957 and 1958, with comparisons

Class	Consumption		Change in consumption	
	1957 Tons	1958 Tons	Tons	Per cent
Chemical nitrogen materials	3,706,428	3,877,377	170,949	4.6
Natural organic materials	479,671	493,252	13,581	2.8
Phosphate materials	2,415,963	2,403,845	-12,118	-0.5
Potash materials	460,899	448,538	-12,361	-2.7
Secondary & Trace nutrient materials	943,243	939,728	-3,515	-0.4
Total	8,006,204	8,162,740	156,536	2.0

TABLE 10. AMMONIATED PHOSPHATES consumed as direct-application materials, by grades, year ended June 30, 1958¹

State and region	Grade/					State and region	Grade/				
	11-40	13-39	16-20	27-14	23-53		11-40	13-39	16-20	27-14	23-53
New York	78	0	0	0	0	Alabama	0	0	0	0	1,263
New Jersey	22	0	0	0	0	Mississippi	9	6	73	0	232
Pennsylvania	343	0	0	0	109	East South Central	11	24	73	0	3,456
Maryland	11	0	0	0	4						
Middle Atlantic	454	0	0	0	113	Arkansas	69	113	747	0	2
Virginia	40	0	0	0	999	Louisiana	35	12	3,981	0	0
North Carolina	0	0	0	0	181	Oklahoma	517	3,206	4,753	0	116
South Carolina	0	0	0	0	75	Texas	2,918	11,604	28,732	0	2,809
Georgia	0	0	0	0	285	West South Central	3,539	14,935	67,317	0	3,027
Florida ^{3/}	5	0	0	0	0						
South Atlantic	45	0	0	0	1,541	Nebraska	2,700	81	2,494	401	0
Ohio	2,031	0	194	0	638	Idaho	785	375	2,594	16	1,173
Indiana	3,823	65	62	0	764	Wyoming	93	38	145	16	4,025
Illinois	2,388	134	680	1	1,777	Colorado	154	965	1,071	0	0
Michigan	1,519	4	0	0	1,777	New Mexico	675	1,058	3,941	0	2,199
Wisconsin	157	17	12	0	125	Arizona	3,133	3,074	27,127	645	2,199
East North Central	9,608	220	548	0	3,796	Utah	1,773	23	1,660	11	24
Minnesota	10,773	2,138	4,777	464	937	Nevada	43	126	865	110	5
Iowa	1,918	2,708	9,257	831	606	Mountain	9,158	5,739	46,996	4,336	7,803
Missouri	1,369	216	1,097	0	12	Washington	1,894	653	14,486	7,616	259
North Dakota	26,503	3,702	23,648	1,076	191	Oregon	1,710	662	22,031	209	130
South Dakota	2,065	293	5,773	686	309	California ^{4/}	1,527	1,803	66,256	2,292	686
Nebraska	1,619	1,325	5,027	15	2,309	Pacific	14,111	6,166	104,795	10,135	1,073
Kansas	818	7,840	26,316	0	1,144						
West North Central	45,025	16,372	74,635	3,212	5,502	Hawaii	1,095	0	261	0	1,091
Kentucky	2	18	0	0	446	Puerto Rico	0	0	0	0	11
Tennessee	0	0	0	0	1,932	United States	83,066	45,476	295,015	17,683	27,413

age sludge, while the tonnages of the lower grade products (dried manures, etc.) did not change appreciably.

PRIMARY PLANT NUTRIENTS

Fertilizers used in 1957-58 contained a total of 6,512,387 tons of N, available P_2O_5 , and K_2O . The quantities of these nutrients consumed in each of the areas are shown in table 11, and the changes from the preceding year are given in table 12. The consumption of the nutrients was 135,185 tons (2.1 per cent) more than that (6,377,202 tons, revised) in 1956-57. In 1957-58 the nutrients comprised 2,284,359 tons of N, 2,292,890 tons of available P_2O_5 , and 1,935,138 tons of K_2O . Compared with the preceding year, nitrogen increased 149,072 tons (7.0 per cent), but decreases occurred in available P_2O_5 (12,102 tons, 0.5 per cent), and K_2O (1,785 tons, 0.1 per cent). As shown in table 7, the national weighted average of primary nutrients in all fertilizers containing these nutrients was 30.18 per cent in 1957-58 and 29.30 per cent in the preceding year. Although the tonnage of fertilizers containing the nutrients in 1957-58 was 0.9 per cent less than in 1956-57, the quantity of primary nutrients supplied was 2.1 per cent more.

Mixtures comprised 66.5 per cent of the total tonnage of primary nutrient fertilizers and supplied 37.4 per cent of the N, 78.4 per cent of the available P_2O_5 , and 87.0 per cent of the K_2O . Compared with 1956-57, mixtures supplied 1.4 and 0.2 per cent more N and K_2O and 1.0 per cent less available P_2O_5 . While the tonnage of mixtures decreased 2.4 per cent in 1957-58, the total content of N, available P_2O_5 , and K_2O was only 0.1 per cent lower. As shown in table 7, the national weighted average of primary nutrients in mixtures was 30.22 per cent in 1957-58 and 29.53 per cent (revised) in the preceding year.

Primary nutrient materials used for direct application comprised 33.5 per cent of the total tonnage of fertilizers containing such nutrients; they accounted for 62.6 per cent of the N, 21.6 per cent of the available P_2O_5 , and 13.0 per cent of the K_2O . The quantities of N and available P_2O_5 supplied by direct application materials were, respectively, 10.6 and 1.4 per cent higher, while that of K_2O was 1.8 per cent lower, than in the preceding year. Although the tonnage of materials containing these nutrients increased 2.3 per cent in 1957-58, the total quantity of N, available P_2O_5 , and K_2O supplied thereby, increased 6.9 per cent. This is reflected in the national average of the total nutrient content of materials, shown in table 7, which was 30.11 per cent in 1957-58 and 28.81 per cent in the preceding year.

Although the national total of primary nutrients was higher in 1957-58 than in 1956-57, there were decreases in consumption of one or more of the nutrients, supplied by either mixtures or materials, in 16 of the 51 areas (table 12). In 12 areas, however, the increase in the quantity of a nutrient supplied by either a mixture or a material was sufficiently high to offset the decrease in that nutrient in the other category. In the other 34 areas the decrease in the nutrient in one category was not offset by an increase in the other category. Nitrogen decreased in 15 such areas, available P_2O_5 in 26, and K_2O in

23. Most were in the southeastern part of the country.

The national use of nitrogen increased 149,072 tons, of which 11,578 tons (7.8 per cent) were supplied by mixtures and 137,494 tons (92.2 per cent) by materials. The increase in nitrogen was largest in the West North Central region, followed by the East North Central and Pacific regions, while the largest decrease was in the East South Central region.

The national use of available P_2O_5 decreased 12,102 tons. The quantity in mixtures decreased 19,036 tons, while that in materials increased 6,934 tons. The decrease used in mixtures was largely in the South Atlantic and East South Central regions. While there were variations in the changes in the other areas, the principal increases for mixtures were in the East North Central and Pacific regions and for materials in the East and West North Central and the Mountain regions.

National use of K_2O decreased 1,785 tons. The use in mixtures increased 2,789 tons while that in materials decreased 4,574 tons. The higher consumption of K_2O in mixtures chiefly in the South Atlantic, East North Central, and Pacific regions more than offset its lower use in other areas, notably the West North Central and East South Central regions and Puerto Rico. Its use in direct application materials was generally lower in

the southeastern part of the country while only in the East North Central region were increases shown in all of the states.

Quantities of primary nutrients in the principal kinds of fertilizers used in 1957-58 are shown by regions in table 13. Seventy-seven per cent of the national consumption of nitrogen was in four commodities—N-P-K mixtures, anhydrous ammonia, ammonium nitrate, and ammonium sulfate—which supplied, respectively: 34.2, 21.0, 16.5, and 5.3 per cent. These four commodities accounted for 61 per cent (Pacific) to 92 per cent (Middle Atlantic) of the regional consumptions. In the Pacific region aqua ammonia supplied a large part of the nitrogen, while in the Middle Atlantic region 80 per cent of the nitrogen was in N-P-K mixtures.

More than 76 per cent of the national consumption of available P_2O_5 was in two commodities—N-P-K mixtures and superphosphate grades over 22 per cent P_2O_5 —which supplied, respectively, 68.8 and 7.4 per cent. They supplied 39 per cent (Pacific) to 91 per cent (South Atlantic) of the regional consumptions. Ammoniated phosphates supplied an important part of the P_2O_5 in the western part of the country.

N-P-K mixtures supplied more than 76 per cent of the national consumption of K_2O . The regional proportions ranged from 61 to 86 per cent.

TABLE II. PRIMARY PLANT NUTRIENTS CONSUMED in mixtures and in mixtures and materials combined, year ended June 30, 1958

State and region	Consumption of nutrients in mixtures				Consumption of nutrients in mixtures and materials			
	P ₂ O ₅			Total N, available P ₂ O ₅ , and K ₂ O	P ₂ O ₅			Total N, available P ₂ O ₅ , and K ₂ O
	N	Available	Total		N	Available	Total	
Maine	13,936	20,472	21,112	20,410	14,533	22,534	22,235	22,125
New Hampshire	1,080	9,047	9,116	9,009	1,446	9,581	9,586	9,381
Vermont	1,931	6,137	6,346	6,607	14,695	9,243	9,249	9,249
Massachusetts	7,800	7,130	7,518	6,716	6,568	9,746	9,371	7,136
Rhode Island	997	1,569	1,657	1,580	1,137	1,675	1,714	1,661
Connecticut	10,472	2,666	3,028	3,028	10,472	2,666	3,028	3,028
New England	26,473	43,363	44,930	45,214	51,546	50,722	50,535	46,674
New York	36,327	66,417	68,919	57,134	159,798	46,085	77,055	98,850
New Jersey	11,007	21,044	21,695	20,448	32,499	13,930	22,345	23,113
Pennsylvania	30,746	71,633	74,325	67,155	169,714	37,474	78,618	86,497
Delaware	4,133	9,097	9,456	9,704	20,924	4,815	9,936	9,936
District of Columbia	293	294	302	161	666	776	329	347
Maryland	10,468	29,348	31,077	27,380	69,340	15,137	30,447	37,784
West Virginia	2,255	7,881	8,352	6,884	17,680	3,297	9,243	9,243
Middle Atlantic	98,175	205,780	214,176	188,940	436,903	121,434	224,243	235,464
Virginia	26,353	64,439	73,016	69,849	164,061	39,203	71,517	72,128
North Carolina	36,108	113,159	121,924	127,056	109,655	117,044	126,373	134,332
South Carolina	23,691	52,963	56,693	53,614	108,208	55,511	77,384	77,384
Georgia	43,644	106,006	112,079	112,823	262,473	100,170	110,126	116,584
Florida	72,481	217,222	226,651	216,833	282,293	103,756	115,120	123,183
South Atlantic	223,635	486,612	471,015	479,575	1,131,822	411,344	446,892	495,366
Ohio	53,696	137,188	143,521	126,110	316,954	71,184	145,674	154,664
Indiana	53,996	143,748	148,132	135,031	330,795	66,682	155,110	177,869
Illinois	71,997	184,756	196,012	179,649	371,832	98,072	177,420	240,000
Michigan	34,464	96,623	96,179	86,767	213,938	47,413	96,773	101,641
Wisconsin	17,488	64,477	67,321	60,107	156,072	26,121	57,092	71,107
East North Central	159,205	502,388	543,387	507,724	1,025,317	339,164	656,076	787,708
Minnesota	19,257	69,337	71,489	47,184	136,408	33,178	59,438	55,017
Iowa	21,157	61,548	66,211	43,669	130,514	49,440	96,438	96,438
Missouri	30,347	96,821	99,460	49,819	144,687	83,543	171,766	135,440
North Dakota	4,043	8,807	9,049	1,072	14,202	12,203	36,343	37,106
South Dakota	1,416	2,443	2,612	144	4,003	6,362	7,066	1,460
Nebraska	3,419	7,088	7,380	1,299	12,006	24,144	30,869	1,240
Kansas	7,803	13,552	17,038	3,445	27,403	37,077	54,326	8,051
West North Central	97,664	224,769	233,639	147,332	469,743	351,718	359,169	433,743
Kentucky	22,730	50,006	56,267	53,081	128,037	37,334	61,013	64,564
Tennessee	22,779	49,714	52,431	46,324	118,017	42,907	55,609	59,884
Alabama	25,038	77,582	82,903	71,403	179,443	72,059	86,944	26,937
Mississippi	15,665	23,469	27,365	21,126	66,260	106,120	30,836	43,816
East South Central	86,212	203,831	210,366	196,734	482,777	261,220	243,020	265,201
Arkansas	9,215	20,761	21,777	19,037	49,013	22,621	26,290	27,553
Louisiana	10,332	20,617	21,317	21,432	47,347	21,432	29,772	18,790
Oklahoma	4,766	10,598	11,029	4,289	15,613	9,900	20,551	22,134
Texas	28,429	46,248	48,371	28,024	93,711	144,263	84,736	30,680
West South Central	46,726	97,744	102,308	63,424	209,704	260,076	155,001	166,139
Montana	600	2,328	2,560	1,414	6,340	12,364	12,336	93
Wyoming	1,484	1,616	1,664	1,396	2,590	21,387	13,985	14,819
Idaho	1,877	2,017	2,094	800	2,811	3,080	3,088	3,088
Colorado	1,742	2,639	2,750	1,010	2,639	14,643	10,666	14,643
New Mexico	433	564	590	119	1,016	8,551	7,559	7,776
Arizona	3,394	5,934	6,104	1,286	11,384	48,440	20,160	20,027
Utah	372	608	632	172	7,598	6,247	6,764	6,764
Nevada	333	240	249	60	533	205	205	222
Mountain	9,394	12,831	13,422	3,036	25,221	113,000	78,509	80,598
Washington	4,270	6,656	6,900	4,036	14,962	26,329	17,375	17,369
Oregon	4,813	6,152	6,460	2,842	9,853	10,666	13,088	13,088
California	33,328	36,730	35,300	19,870	87,738	238,285	85,260	30,582
Pacific	40,323	43,384	47,182	26,348	112,655	344,420	115,500	118,830
Total	825,341	1,785,300	1,888,645	1,654,145	4,065,390	2,233,116	2,076,335	2,036,304
Hawaii	7,756	3,409	3,560	11,144	22,109	17,167	6,297	7,304
Puerto Rico	21,705	9,879	11,247	18,621	30,205	31,006	10,258	18,799
United States:								
1957-58	855,600	1,779,500	1,903,150	1,683,510	4,137,704	2,230,899	2,080,899	2,036,304
1956-57	841,606	1,817,606	1,906,777	1,681,121	4,242,373	2,135,087	2,034,990	2,034,990
1955-56	796,073	1,703,073	1,897,130	1,634,950	4,236,698	1,933,342	2,017,420	2,017,420

1/ Including 2 percent of the collected phosphate and 3 percent of the phosphate rock marketed for direct application. 2/ Including an average of 2.5 percent of the collected phosphate and 3.0 percent of the phosphate rock marketed for direct application. Including an estimated 3.4 percent, 3.5 percent, and 6.7 percent for test demonstrations. 3/ Revised by addition of 1,001 tons in North Dakota. 4/ Revised by addition of 350 tons in Kansas and 1,001 tons in North Dakota. 5/ Revised by subtraction of 1,340 tons in Pennsylvania.

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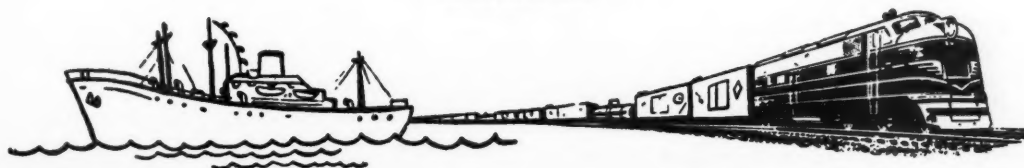
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INDUSTRIAL AND AGRICULTURAL
CHEMICALS**



... and now FCMSI

What is it—a new expression in nucleonics, or a new kind of tooth decay deterrent? Neither, of course. The letters FCMS stand for FARM CHEMICALS Marketing Seminar. Better get used to the term. You'll be reading a lot about it in the months to come.

On November 16-17, at the Barbizon-Plaza hotel in New York City, this magazine will present the *second phase* of its new marketing approach, initiated just 10 months ago.

The entire morning session on the first day will be devoted to a basic study of marketing, when we'll bring you presentations from marketing experts in other manufacturing industries—where successful marketing programs have been developed, *and attempt to relate their efforts to farm chemicals marketing.*

Then we'll get into the field of market research in sales planning with such topics as "Market Research and Its Importance to Farm Chemicals Manufacturers". This will be followed by a discussion on "How to Initiate Your Market Research Program."

Each session will be followed by a question and answer session aimed to make *you* an active participant. Space does not permit discussing the entire program on this page. We suggest that you consult the complete program on page 28 of this issue. Then lose no time in making your reservation!

The farm chemicals industry is indebted to a host of pioneering scientists and engineers who have helped to introduce new products and revolutionary manufacturing techniques. *But their efforts are being ill-rewarded!* Compared to other manufacturing industries, including the parent chemical industry, farm chemicals is a static market.

The situation is similar to what has happened in agriculture generally. Technology has far outstripped marketing science. (Some experts say that farmers have been over-sold on mechanization.) The result: stagnation.

This doesn't mean that manufacturing research should be brought to a halt. On the contrary, it ought to continue unabated. But it does seem only logical to us that more and more emphasis be placed on *making the industry more market-oriented.*

Pick up most any publication professing to serve the industry, however, and you'll find that most of its editorial content, aside from the customary news columns, stresses *production . . . production!*

We don't subscribe to that format. And we changed our entire editorial program last January to prove it.

Ironically, we have had little difficulty convincing members of the industry that the marketing approach is the right one. But the difficulty comes in erasing the confusion that exists concerning the *meaning* of marketing!

Some people have it all mixed up with the *sales approach*. "Produce a product and then go out and develop a *need* for it."

Actually, what we're trying to get across is the principle established by Bert Cremers, vice president and general manager, Michigan Alkali division, Wyandotte Chemicals Corp., at the recent meeting of the National Industrial Conference Board:

Business success starts in the market and works back to the plant!

Giving technical people the credit they deserve, Cremers remarked: "Our present civilization surpasses all previous ones in technical development—fields of production, transportation, communication and so forth.

"With all these great advances, the appreciation of sales and distribution has lagged behind the great technical skills which have resulted in raising the standard of living in this country beyond anything the world has even seen.

"Failure on the part of management, particularly the financial side, to understand the 'market first' concept, to realize that business success starts in the market and works its way back to the plant is a major roadblock to profits."

Patterns aren't easily changed. Despite the fact that you can blare out your message in more media than your company founders ever dreamed of—farm papers, TV, radio, bill boards, etc.

You've found it comparatively easy to make a better brand of fertilizer or pesticide—but somehow it's just as hard to sell today as several decades ago when farmers regarded using farm chemicals as sinful! Reason for this, of course, is that there's more competition for the farmer's dollar.

It won't be any easier in 1960, either. In fact, it might be a whale of a lot tougher—what with the reported decrease of some \$1½ billion in 1959 farm income from 1958.

One thing is almost as sure as those two old standbys—death and taxes. That's the fact that *demand for farm chemicals varies directly with farm cash income.* Note that we said *almost*, however. You can change this pattern with a new *market first* policy.

Don't forget to make that reservation for FCMS now!

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When this Champaign, Illinois fertilizer manufacturer decided to replace one of its model HA "PAYLOADER" units (that hadn't even had the engine head off in six years) it chose a model H-25 . . . but not before it had won a side-by-side competitive demonstration.

Harry Lange, foreman, summed up the reasons for their decision, "The H-25 had a lot of advantages in getting in and out of boxcars and getting around to the different fertilizer bins. The other was too slow and sluggish."

William Scott, operator, added, "The H-25 is quicker on the lift, dump and go, gets into smaller places, has more power and digs-in faster to get quick, full loads."

Want to find out what an H-25 can do in your plant? Want to see what its 2,500 lb. carry capacity, only 6-ft. turning radius, power-shift transmission (with two speeds each direction), easy power-steer, and many other advance features can do for *your* production? Ask your Hough Distributor for a demonstration.

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Cycles**

2. Far More Compact

**3. Gets Full Loads
Faster**

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704 Sunnyside Ave., Libertyville, Ill.

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